

Systems Analysis of Real-World Obstacles to Successful Cervical Cancer Prevention in Developing Countries

Papanicolaou screening is feasible anywhere that screening for cervical cancer, the leading cause of cancer-related death among women in developing countries, is appropriate. After documenting that the Vietnam War had contributed to the problem of cervical cancer in Vietnam, we participated in a grassroots effort to establish a nationwide cervical cancer prevention program in that country and performed root cause analyses of program deficiencies.

We found that real-world obstacles to successful cervical cancer prevention in developing countries involve people far more than technology and that such obstacles can be appropriately managed through a systems approach focused on programmatic quality rather than through ideological commitments to technology. A focus on quality satisfies public health goals, whereas a focus on technology is compatible with market forces. (*Am J Public Health*. 2006;96:480–487. doi:10.2105/AJPH.2004.061606)

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The great struggle to come, already emerging, is that between public health and personal responsibility, on the one hand, and the market on the other. The market can, and does already, overshadow both 'genetics medicine' and public health. It sets the stage and the social context, and thus has a commanding and still-rising power. The ultimate struggle I have in mind is between the population perspective of public health and the individualist perspective of the market.

—Daniel Callahan¹(pp174–175)

MOST OF THE WORLD'S

premature deaths can be prevented with simple, available interventions; what is not clear is how to make these interventions more widely available to the people who need them.² Cervical cancer, for example, is both preventable and curable, yet it remains the leading cause of cancer-related death among women in developing countries.³ Moreover, the impact of this disease is likely to increase over time. Declining birth rates throughout the developing world have induced a profound demographic transition that is leading to a shift in disease burden away from diseases of childhood toward cancer and other diseases of adulthood.⁴

Human papillomavirus (HPV; the sexually acquired causative agent of cervical cancer) prophylactic vaccines, prospects for which remain uncertain, may potentially benefit only those generations of women who will not yet have initiated sexual activity

by the time putative vaccines are first licensed, and 20 to 30 years may elapse from the time any vaccine is first licensed to the time most people in developing countries have access to it.⁵ Any future vaccinated populations will require less screening rather than no screening.^{6,7} When fully successful, conventional Papanicolaou (Pap) cytologic screening reduces cervical cancer rates by 60% to 90% within 3 years of introduction to populations that have not previously been screened; these reductions in incidence and mortality are consistent and dramatic across populations.⁸

We have advocated making Pap screening services available without further delay to women in high-risk demographic groups anywhere such services are feasible but unavailable,⁹ not because the Pap test will forever remain the most effective cervical screening option in all settings but because, in the case of any setting, it is both prudent and strategically necessary to implement Pap screening before rather than after completing research on either vaccines or what may become an endless series of novel screening technologies.¹⁰ Opportunity costs, borne by the underserved, are associated with prioritizing research on novel health interventions in settings where established interventions are feasible but unavailable, and research on novel screening technologies in developing countries has

been justified by understandable yet incorrect assumptions that Pap screening is not feasible in such settings.^{11,12} Groups performing research on novel screening technologies have overestimated costs for Pap tests in developing countries 10- to 100-fold,⁹ overlooking the finding that Pap screening programs have been operational in several developing countries for more than 30 years.¹³

The Pap test is one of the most inexpensive tests in American medicine, and we have suggested setting aside the paradoxical yet commercially useful belief that such a labor-intensive item will be inexpensive in settings where salaries are high but expensive in settings where salaries are low.⁹ Assuming that it is not appropriate to screen for cancer in communities without access to curative treatment services, Pap screening appears to be feasible anywhere that cervical screening is appropriate,^{9,14} in that it is difficult to envision either urban or rural communities with access to surgical and radiation therapy services but not to cytology laboratories.

Past failures of cervical screening efforts in developing countries can be directly related not to technological limitations of the screening test but to failures in system quality management,^{15,16} the goal of which is to confirm that women in targeted demographic groups are screened and receive appropriate follow-up.¹⁷ A shift in paradigmatic focus

from technology toward quality is therefore essential.⁹ Sociopolitical obstacles to achievement of adequate programmatic quality are widespread and may arise when improved quality, which increases the likelihood of beneficial outcomes among recipients of care, does not increase the likelihood of increased incomes among providers of care.¹⁸

We have suggested that interactions between programmatic quality and related sociopolitical obstacles will be elucidated by following the money as well as the science involved with cervical screening activities.¹⁸ Here we propose that real-world obstacles to successful cervical cancer prevention in developing countries are more appropriately addressed through a systems approach incorporating root cause analysis and focused on the concept of health care quality than through an ideological commitment to a single programmatic component. We also suggest that a focus on quality is more compatible with public health and humanitarian goals, whereas a focus on technology is more readily aligned with market forces.

METHODS

War is associated with male sexual promiscuity, which in turn contributes to the development of cervical cancer among sexually monogamous women.¹³ In 1996, a case-control study sponsored by Stanford University documented that the Vietnam War had contributed substantially to the problem of cervical cancer in contemporary Vietnam,¹⁹ and the Viet/American Cervical Cancer Prevention Project was established as an all-volunteer nonprofit organization. Working as unpaid

volunteers, project participants were free to obey the logic of the situation on the ground in Vietnam rather than the logic of competitive grant renewal.²⁰ Publication of data linking war to disease was delayed for 8 years in an attempt to ease the process of reconciliation by offering what most would acknowledge to be a remedy^{9,21} in advance of what some will perceive to be an accusation.^{19,20}

In 1999, we performed a cost-effectiveness analysis of Pap screening in Vietnam in response to concerns expressed by Vietnamese and global health policymakers about the feasibility of Pap screening in developing countries. Previous experience in the United States²² had shown us the uncertainties associated with reported prices for Pap tests. Rather than relying on Pap test prices based on local fee schedules, we used the total cost of a hypothetical Vietnamese screening system to deduce the cost of a single screening event. Our systems approach allowed groups of health workers prone to competition to view themselves in relation to other categories of workers, to their own shares of system costs and responsibilities, and to the system goal of improving health outcomes among women.

Our cost-effectiveness analysis documented that, contrary to widespread belief, Pap screening in developing countries such as Vietnam is extraordinarily inexpensive,²¹ and our findings enabled de novo establishment of population-based public-sector Pap screening services in Vietnam. Our analysis also implied that Pap screening in other developing countries was substantially more feasible than had previously been perceived. The validity of

our analysis was challenged by the Alliance for Cervical Cancer Prevention (ACCP).²³ The primary focus of ACCP, established in 1999 through a gift of \$50 million from the Bill and Melinda Gates Foundation, is research on novel cervical screening technologies in developing countries.²⁴

Between 1999 and 2004, population-based Pap screening programs were established in 10 districts in southern and central Vietnam. High-risk target demographic groups were defined according to age and geographic location. The target age group, as defined by the natural history of cervical neoplasia, consists of women between the ages of 30 and 55 years.²¹ Cervical cancer rates are 26 per 100 000 in southern Vietnam³² and 4.4 per 100 000 in northern Vietnam,³³ and these rates are associated with regional differences in HPV prevalence³⁴ and the movement of soldiers during a previous epoch.¹⁹ At present, cervical cancer rates in northern Vietnam do not appear sufficiently high to warrant initiation of population-based screening.²¹

All screening and treatment activities are being performed entirely by Vietnamese public-sector health providers. In certain districts, erosion of programmatic quality has been observed in the form of decreases over time in Pap test rates of atypia, follow-up rates of women with atypical test results, and yields of biopsy-confirmed cervical neoplasia. Public reporting of information on health care quality can improve health outcomes,²⁵ but a crucial and ongoing challenge is finding methods to achieve measurement for public reporting of quality that do not undermine measurement for quality improvement.²⁶ Detailed Vietnamese laboratory

screening data are not presented in this article out of concern on the part of Vietnamese and American program participants that public reporting may lead to disciplinary action that would undermine future quality improvement efforts.

Because the true causes of problems are often hidden behind more obvious symptoms,²⁷ we performed root cause analyses of cervical screening failures in Vietnam and other developing countries. Root cause analysis is a qualitative method that focuses on determining the underlying systems that set the stage for error,²⁸ and such analyses are conducted to improve patient outcomes rather than to effect punitive change. The goal of any root cause analysis is to determine what happened, why it happened, and what to do to prevent it from happening again.²⁹ Those most familiar with a situation are interviewed, and, through a persistent series of “why” questions, levels of health care processes at which failure occurs are determined.³⁰

We interviewed 5 Vietnamese public health department directors and vice directors, 8 nurses, 5 hospital directors, 5 cytotechnologists, 5 laboratory directors, 5 gynecologists, 3 community outreach leaders, and 10 pathologists from Hanoi, Hue, and Ho Chi Minh City. All interviewees were involved with cervical screening activities in Vietnam. We interviewed as well laboratory directors and pathologists involved with cervical screening in developing countries other than Vietnam during international health conferences. Additional information pertaining to cervical screening failures in developing countries was obtained through literature

reviews. Because certain research and commercial interests represent obstacles to success in Vietnam,³¹ we also conducted interviews with research personnel and industry representatives attending international health conferences and obtained further information

through literature reviews. On the basis of our root cause analyses, we constructed a system map outlining obstacles to successful cervical screening to display how changes in each area of the system of cervical cancer prevention activities affect other areas.

RESULTS

The results assembled from our interviews and literature reviews were categorized according to the perspectives of different groups of program participants and are presented in Table 1. This system map outlines

some of the ways in which competing incentives among groups with shared interests in cervical cancer prevention affect program success, defined as ensuring that 100% of women in high-risk target demographic groups are screened and receive appropriate follow-up and treatment.

TABLE 1—System Map of Real-World Obstacles to Successful Cervical Cancer Prevention in Developing Countries

Program Group (Quality Goal)	Clients	Competing Incentives	Quality Measures	Obstacles to Success
High-risk women (100% program participation)	...	Higher prices for screening visits reduce program participation	Laboratory data linked to population registers ¹⁸	Higher net reimbursement for any other program group increases screening visit prices and reduces participation
Screening test collectors (100% coverage of high-risk demographic groups)	Public health departments and private-sector patients	Collecting cytologic, HPV, or visual screening tests in private rather than public sector increases net reimbursement	Laboratory data linked to population registers ¹⁸	Reimbursement often inversely linked to program coverage
Pathology laboratory personnel (diagnostic accuracy)	Public health departments and private-sector providers	Decreasing time and money spent analyzing each Papanicolaou test; or HPV test increases net reimbursement	Laboratory data analysis ¹⁸	Reimbursement often inversely linked to accuracy
Dysplasia treatment personnel (examine 100% of women with high-risk screening test results)	Public health departments and private-sector patients	Treating patients in private rather than public sector increases net reimbursement	Laboratory data analysis ¹⁸	Reimbursement often inversely linked to treatment of women in high-risk groups
Visual “screen and treat” personnel (100% coverage of high-risk demographic groups)	Public health departments and private-sector patients	Performing visual examinations in private rather than public sector increases net reimbursement	... ^a	Neither coverage nor treatment adequacy can be confirmed ¹⁸ ; reimbursement often inversely linked to coverage and treatment of women in high-risk groups
Public health departments (goals defined by political leaders)	Political leaders	Competing sources of mortality (e.g., HIV, malaria, tuberculosis, avian influenza)	Budgetary allocation from government	Goals of political leaders often not linked to program coverage
Academic investigators and nongovernmental organizations (goals defined by grant donors, corporate sponsors, and academic journals)	Grant donors and corporate sponsors	Fund-raising and publications are required for academic career advancement and financial sustainability of nongovernmental organizations	Grants and publications	Grant donor goals, corporate sponsor goals, and academic journal publication acceptance criteria often not linked to program coverage
HPV and monolayer cytology test manufacturers (goals defined by equity stakeholders)	Equity stakeholders	Higher product price increases profit but lowers participation	Stock price	Equity stakeholder reward often not linked to program coverage
Vaccine manufacturers (goals defined by equity stakeholders)	Equity stakeholders	Vaccines will not eliminate screening requirements and may compete with screening for public health budgets; higher vaccine unit costs may lower coverage rates of both vaccination and screening programs	Stock price	Equity stakeholder reward often not linked to program coverage; public health departments may delay development of screening programs pending vaccine development

Note. HPV = human papillomavirus.

^aMeasurement of screening and treatment activity limited to nonverifiable, self-reported activity logs.

Screening Test Collectors' Perspective

The results from our literature review show the well-recognized obstacle to successful cervical cancer prevention in developing countries³⁵ like Vietnam: an overreliance on reproductive health services for Pap test collection. Unfortunately, the target age group for reproductive health services and the target age group for cervical screening services barely overlap. As a result of the transition toward a market economy in Vietnam, increases in private-sector health provider incomes have dramatically outpaced increases in public-sector incomes, producing incentives against conducting Pap screening in the public sector.

Pathology Laboratory Personnel Perspective

Root causes of suboptimal diagnostic performance in Vietnamese laboratories were similar to those previously reported for American and Mexican laboratories^{36–38} and included obsolete supplies, poorly maintained microscopes, insufficient training, and suboptimal working conditions. The results from our interview with pathologists in developing countries show that cytotechnologists are often allocated insufficient time to perform microscopic examinations of Pap tests, which adversely impacts detection rates of cervical neoplasia.

Dysplasia Treatment Personnel Perspective

We found that salary differentials between the private and public sectors were far more pronounced for physicians than for other health providers, yielding few financial incentives to follow-up on women with positive screening test results when

tests are collected in the public sector. Successful follow-up of screen-positive women in developing country settings, including Vietnam, has been achieved by allocating budgets for dedicated personnel to recontact women with positive test results.³⁹ Successful follow-up of women from both urban and rural areas has been demonstrated in Cameroon (100% follow-up),⁴⁰ China (100%),^{41,42} Costa Rica (97%),⁴³ South Africa (91%),⁴⁴ Venezuela (89%),⁴⁵ and Zimbabwe (98%).⁴⁶

Visual “Screen and Treat” Personnel Perspective

Visual “screen and treat” specifically refers to the screening algorithm by which a visual screening test of the cervix (after application of dilute acetic acid or Lugol’s iodine, or both) is coupled with immediate cryosurgery in all test-positive cases. Visual screening tests have false-negative rates comparable to those associated with Pap tests, but they involve much higher false-positive rates.⁴⁷ Because Pap screening is feasible wherever cervical screening is appropriate, visual screen and treat requirements in any particular setting are not apparent. However, the results from our literature review show a widespread tendency to incorrectly attribute past failures of cervical screening in developing countries to technological limitations of the Pap test, rather than to sociopolitical factors that impact any screening test. These incorrect perceptions produce incentives to implement noncytologic screening methods such as visual screen and treat. Because, in real-world settings, visual screen and treat programs produce no physical evidence on

which to base meaningful program audits, the existence, let alone effectiveness, of such programs will not be verifiable outside of research settings.¹⁸ Although the long-term safety of large-scale overtreatment has not been established,³⁹ the high false-positive rate associated with visual screening techniques will require performing cryosurgery on 18% to 71%^{42,46,48} of women who are screened.

In the case of visual screen and treat, screen-positive women undergo cryosurgery before the possibility of invasive carcinoma has been excluded, which has problematic implications for provider acceptance, patient safety, and informed consent.¹⁰ Approximately 18% to 71% of women screened will be informed that they have a positive cervical cancer screening test, that cryosurgery will probably render it impossible for anyone to determine whether cancer is present, and, if cancer is in fact present, that cryosurgery will be ineffective.

Public Health Departments' Perspective

There appears to be a genuine lack of support for cervical cancer prevention efforts within the political structures of many developing countries,⁴⁹ including Vietnam. Coverage of the target demographic population has not exceeded 40% in any Vietnamese district where population-based Pap screening is currently being performed. Operational funding for all Vietnamese screening activities is being provided entirely by Vietnamese departments of public health, which are under significant pressure to support programs for control of competing

sources of mortality, including HIV⁵⁰ and avian influenza.⁵¹

Academic Investigators' and Nongovernmental Organizations' Perspective

ACCP is a partnership involving 5 nongovernmental organizations: the Program for Appropriate Technology in Health, EngenderHealth, JHPIEGO, the Pan American Health Organization, and the International Agency for Research on Cancer of the World Health Organization. The ideological commitment of the Bill and Melinda Gates Foundation to novel technologies as the best route for improving health outcomes in developing countries explicitly ignores the sociopolitical and power structure changes necessary to redistribute resources within and between societies, and this commitment to such technologies has been criticized as potentially harmful in our conducted literature review.⁵²

Manufacturers' Perspective

All for-profit corporations have fiduciary obligations to shareholders who are interested primarily in return on investment. Certain business strategies intended to benefit shareholders have been appropriately criticized by public health authorities.⁵³

DISCUSSION

As cervical cancer, a preventable public health problem, escalates with mathematical certainty throughout the developing world, our analysis shows that developing country health systems are struggling to succeed against an array of real-world obstacles, including nongovernmental organizations and academic investigators distracted by fund-raising

obligations disconnected from public health goals (Table 1). For example, a critical founding assumption of ACCP, apparently uninformed by root cause analysis, is that novel screening technologies, rather than Pap screening, constitute the most likely solution to the problem of cervical cancer in developing countries.²⁴ ACCP's leaders are "loath" to recommend establishment of Pap screening services in high-risk communities with no cervical screening programs currently in place⁴⁵ and understandably persist in denying evidence of the success of Pap screening in the developing world,⁵⁴ despite documented reductions in cervical cancer incidence and mortality rates attributed to Pap screening in developing countries such as Colombia, Chile, and Costa Rica.^{13,49}

Despite voluminous evidence to the contrary,^{13,21,55} ACCP leaders have concluded that Pap screening is not "a viable option" in many developing countries.⁵⁴ These assumptions and denials undermine progressive public health leaders in developing countries such as Vietnam¹⁰ and empower apologists for the status quo,⁵⁶ yet they may nonetheless serve as cornerstones of the types of monetarily successful service differentiation strategies routinely used to compete in donative market environments.⁵⁷ As a result, they are unlikely to change unless corporate sponsors and philanthropic donors unaccountable to medically underserved populations restructure the prevailing incentives.

ACCP leaders have characterized the Guanacaste Project in Costa Rica as a visionary landmark for developing country cervical cancer prevention efforts.⁵⁸

Before root cause analyses determined the levels at which programmatic failure had occurred in the Costa Rican screening system,⁵⁹ the US National Cancer Institute and corporate sponsors allocated millions of dollars to screen approximately 10 000 women in Guanacaste Province with an unprecedented array of novel screening technologies,^{60–63} some of which are now obsolete. Data collected from women in Guanacaste have been used to market novel screening technologies in the United States and formed the basis for numerous academic publications, thereby benefiting both research and commercial interests. However, it is uncertain whether the Guanacaste Project benefited women in any developing country setting outside of Guanacaste Province.

Technological refinements to the Pap test have not been associated with improved long-term clinical outcomes in any setting,⁶⁴ and they are unlikely to be associated with improved outcomes in the future.⁶⁵ Although it is not meaningful to compare characteristics of novel screening tests analyzed in American reference laboratories with those of Pap tests analyzed in developing countries,^{9,66} all novel screening tests collected in Guanacaste were shipped to American reference laboratories for analysis.^{43,60–63} Only conventional Pap tests collected in Guanacaste were analyzed in Costa Rica.

At the time the Guanacaste Project was initiated, a system-wide quality improvement program also was proposed for Costa Rica that involved the establishment of a central coordinating unit, a colposcopy network, and consolidated

laboratories.⁵⁹ Between 1997 and 2000, age-standardized cervical cancer mortality rates in Costa Rica declined from 10.2 per 100 000 to 8.0 per 100 000.⁴⁹ Because, to our knowledge, only conventional Pap tests have been used in public-sector screening in Costa Rica, it appears that the public health success documented in that country is attributable to a systems approach focused on quality rather than to an ideological commitment to a single programmatic component.

Within developing countries such as Vietnam, obstacles to the achievement of adequate programmatic quality are widespread. All health workers have incentives to increase net reimbursement, which may lead to low coverage of the targeted screening population, inadequate follow-up of screen-positive women, and poor laboratory performance. These patterns of programmatic failure have been observed in both developed and developing countries^{15,37,67,68} and serve as examples of the "prisoner's dilemma" in game theory⁶⁹: Programmatic failures occur when participants uniformly pursue rational self-interests, whereas programmatic successes occur when at least some participants act in a manner partly contrary to rational self-interests.

Thus, successful cervical cancer prevention requires a combination of program managers who care about quality and program stakeholders who exert the political will to entrust managers with levels of authority commensurate with their responsibilities.¹⁸ Active participation by public health leaders is essential but requires support from appropriate governmental authorities, including

ministries of finance. It is not appropriate to screen for cancer in communities without access to curative treatment services, and radiation therapy facilities in Vietnam meet only 10% to 20% of current actual demand.⁷⁰ Although curative treatment facilities are in short supply throughout the developing world, it is paradoxical to cite shortages of required infrastructure as a reason not to develop more,⁹ and we continue to encourage potential donors to consider underwriting equipment costs for such facilities in Vietnam.

Novel technologies do not substitute for root cause analysis and may reinforce sociopolitical, technological, and financial obstacles to successful cervical cancer prevention. Ongoing ACCP randomized trials of novel screening technologies in developing countries include control groups of 75 000 unscreened women.⁷¹ The science and ethics of placebo-controlled trials in developing countries are complex, and we have entreated ACCP to publish a compelling scientific and ethical justification for the inclusion of no-screening arms in its ongoing randomized trials in order to prevent disaffection of medically underserved groups²⁰ such as that occurring after the Tuskegee syphilis experiment,^{72,73} which included an untreated control group of 399 men. Otherwise, we have suggested that women in the no-screening arms of these trials be reassigned to screening arms without further delay.⁹

Both HPV and visual testing are vulnerable to the same quality control problems that have plagued the Pap test.³⁷ In research settings, quality of visual testing degrades more rapidly

than quality of either cytologic or HPV testing.⁷⁴ However, despite intensive research, a consensus definition for a positive visual test result has not been established,⁵⁴ which has problematic implications for future quality control strategies related to visual testing. In most published studies of HPV testing in developing countries, researchers have reported results of Hybrid Capture II HPV tests (Digene Corp, Gaithersburg, Md) collected from women in developing countries but shipped to American reference laboratories for analysis,^{42–44,75} raising concerns of commercial exploitation.²⁰ When analyzed in developing country laboratories, Hybrid Capture II presents difficulties in the areas of reproducibility and accuracy comparable to those of the Pap test.^{76,77} An HPV test priced at \$0.50 would represent a substantial increase over the cost of consumable supplies for a single Pap test in developing countries such as Vietnam¹⁸ and would have a negative impact on program coverage. Hybrid Capture II is currently priced at \$20 to \$30.⁵⁴

The announced partnership between ACCP and the Digene Corporation⁵⁸ suggests that ACCP may become partially accountable to equity stakeholders. ACCP leaders have announced that an HPV test priced at \$5 would be reasonable for developing countries.⁷⁸ Because interlaboratory agreement is a concern in the case of any HPV test that has not undergone extensive comparative field testing,⁷⁹ HPV test quality control may become problematic should genuinely affordable but unvalidated HPV test reagents, such as polymerase chain reaction primers, become available in developing countries.

Visual screen and treat is the only cervical screening strategy that dispenses, in theory, with any requirement to establish a laboratory. To the extent that visual screen and treat is considered feasible, delays in the development of Pap screening services may continue to be rationalized. Because the Pap test will be a triage component of any other visual-based²⁰ or HPV-based^{20,80} screening program, the obsolescence of visual screen and treat would immediately make viable a global consensus strategy by which Pap screening programs would be established immediately, with HPV or visual testing (or both) introduced later.⁹ Demonstration of an increased yield of biopsy-proven neoplastic lesions in a given population will remain the best proof of the value of any nontraditional screening methodology.⁸¹

It would become strategically self-defeating for proponents of HPV or visual testing to delay implementation of Pap screening programs in any setting.¹⁰ The obsolescence of visual screen and treat, an intervention we have characterized as conceptually incompatible with the requirements of “first, do no harm,”^{9,18,20,82} is therefore of critical strategic importance in global cervical cancer prevention efforts. Visual screen and treat requires that women with positive cancer screening test results undergo ablative rather than excisional treatments before the possibility that cancer is present can be excluded. Visual screen and treat would necessitate regular acts of uncontested medical malpractice were it ever to be implemented in the United States,¹⁰ and in any setting it would generate considerable psychological morbidity owing to

justifiable concerns about untreated cancer among up to 71% of women screened.

However, both ACCP⁸³ and the American College of Obstetricians and Gynecologists⁸⁴ have endorsed visual screen and treat as a safe, effective, and cost-effective approach to cervical cancer prevention in low-resource settings (including, presumably, those in the United States), raising concern about the global emergence of an iatrogenic public health problem. Correspondingly, the International Academy of Cytopathology has neglected to provide conceptual support for Pap screening in developing countries, without which donors and governmental authorities may be understandably reluctant to provide material support.²⁰

Disease prevention requires social change, which in turn requires the participation of those for whom the change is intended,⁸⁵ including demographic groups at high risk for disease, appropriate governmental authorities, and essential medical personnel.²¹ Both locally and globally, sociopolitical problems associated with sustaining working coalitions from groups with shared interests but competing incentives constitute critically important real-world obstacles to successful cervical cancer prevention and will remain so irrespective of the screening method(s) eventually used.²¹ In settings where health systems cannot afford to ignore such incentives, laboratory data constitute an essential yet sometimes overlooked fulcrum against which to leverage the social change required to preserve life. ■

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Contributors

E.J. Suba supervised the study and led the writing. E.J. Suba and S.S. Raab performed the root cause analyses. All of the authors assisted with systems analyses and reviewed drafts of the article.

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