Cervical Cancer Prevention in Rural Honduras

Cervical cancer causes significant morbidity and mortality and does so disproportionately in the developing world. This remains true despite the fact that effective prevention and treatment strategies exist. Within this context, we explore the burden of suffering exacted by cervical cancer on rural Honduran women. We also examine what prevention strategies are available and analyze which are most appropriate in this setting. We conclude by assessing current cervical cancer prevention guidelines, how they are or are not being implemented, and make recommendations for improvement.

We come at this issue not only from a didactic perspective but also with experience derived from participatory field research. Due to our own research and development of a community-driven women's health education and prevention program in southern Honduras over the last three years, we are interested in how the impact of this disease can be reduced, in both quantitative and qualitative terms. Work in the developing world comes with its own set of hurdles, mainly due to the lack of resources. Significant among these hurdles is the frequent dearth of research and good quality data on basic health indicators. Thus, throughout this paper we make every effort to be clear in indicating when country-wide versus regional data is being used, and when data from other countries with similar demographic profiles is being used as a proxy. We also draw from our own experiences and field notes as primary sources, which allows for a more complete analysis of the problem than if we limit ourselves to published data.

I. Burden of Suffering

Epidemiology

Cervical cancer is a progressive neoplastic syndrome of the cells of the cervix. Although most invasive cancer arises from squamous cells, about 20% of cervical cancer is associated with dysplastic glandular cells (adenocarcinomas).[1] Over time, these cells can develop changes resulting in precancerous or cancerous forms. The progression can range from cervical intraepithelial neoplasia (CIN) to squamous intraepithelial lesions (SIL) to

carcinoma in situ and eventually to invasive cancer. Because there is usually a long pre-invasive period, during which the risk of metastasis is low and good treatment can be curative, cervical cancer is well suited for screening. Treatment is based on the depth and extent of spread and can be as minimal as cryotherapy or as invasive as a radical hysterectomy. Without treatment, the cancer can metastasize to distant sites and result in death.

World-wide, cervical cancer is the second most frequent cancer and fifth most frequent cause of death from cancer among women.[2] This burden disproportionately impacts the developing world where more than 80% of cases occur.[3] In the year 2000, the World Health Organization (WHO) estimated that there were 471,000 new cases of cervical cancer diagnosed and 233,000 deaths across the globe.[3] Approximately 92,136 of those cases and 37,640 of those deaths were in Latin America and the Caribbean.[4] Globally, cervical cancer has been estimated to account for 2.1% of deaths among women aged 25-64 but in Latin America it accounts for 3.8% of these deaths.[3] The reasons for this disproportionate burden throughout Latin America are not yet completely understood but are thought to be due in part to the high prevalence of HPV infection as well as culturally-specific sexual behavior.[5]

In the year 2000, estimates of the age standardized incidence and mortality rate of cervical cancer in Honduras were 39.6 cases per 100,000 women and 16.8 per 100,000 women respectively.[5] This is in comparison to the United States which that same year experienced an incidence rate of only 1.2 cases per 100,000 [5] with mortality totaling 2.8 deaths per 100,000 women.[6] Moreover, unlike in much of the developed world where cervical cancer mortality has decreased over the last thirty years, mortality has remained almost constant in Latin America. This has resulted in a greater burden of years of life lost (YLL) in the developing world. Cervical cancer contributes over 2.7 million YLL among women aged 25-64 around the world. However, 2.4 million of these YLL lost occur in the developing world and only 0.3 million occur in developed countries. Latin America and the Caribbean is the only world region where cervical cancer is the leading component of YLL.[4] The WHO quantifies the burden of suffering, reporting that cervical

cancer now accounts for 471,000 daily adjusted life years (DALYs) in Latin America.[4] Exactly how much of this burden falls on Honduras has not been explicitly reported.

Risk Factors

There are numerous risk factors for cervical cancer in both the United States and abroad. Although women are usually over 35 when they are diagnosed, the disease is thought to begin much earlier.[7] Universally agreed upon risk factors include human papilloma virus infection (HPV), having multiple sexual partners (or a partner who has multiple partners), early age at first intercourse, a history of sexually transmitted diseases, low socioeconomic or educational status, and smoking. Recent research in Honduras suggests that exposure to smoke from wood burning in the kitchen is also a risk factor for invasive cervical cancer, independent of other factors such as education, parity and number of sexual partners.[8] Methods proposed to mitigate some of these independent risks were examined in a meta-analysis of studies in the developing world as well as in a case-control study in Honduras. These studies demonstrate education to be especially important in empowering women to foster lifestyles that result in decreased risk for cervical cancer. Thus, poor, less educated women are disproportionately affected in terms of both incidence and mortality.[9,10] Although the importance of HPV infection is not universally recognized by providers throughout the country,[11] recent case-control studies in Honduras found that HPV 16 and 18 are associated with 95% of invasive cancers.[7]

Population

Honduras is a nation of varying histories and peoples. Its 7 million people[12] inhabit lands ranging from mountain tops to tropical islands; surviving on labors varying from subsistence farming to international industrial trade; living histories collected from Mayan traditions to colonialism. Our intention is to focus on the population of the United Communities (CU), a small cluster of rural villages in the south. Such focus minimizes these differences and if taken out of context would oversimplify the picture of the landscape of Honduran health. Keeping in mind that the target population is therefore not representative of Honduras at large, we direct our inquiry to the district of Choluteca in southern Honduras.

This district, *Zona* 4, has a population of 76,300, most of who survive on subsistence agriculture. The standard of living is one of the poorest and least developed when compared with other districts. In 2001, only 53.5% of people had access to potable water, 82.8% used wood burning fireplaces in the home to cook, and only 47% of homes had electricity.[13] The majority of people in the district have only an elementary education (35.3%) or less (44.4%). Furthermore, it appears that within the United Communities (CU), women are even less likely to be educated than men.[14]

It is within this broader context of the district that we will focus on the six communities of the CU. These villages are located in the highland areas of two provinces, El Corpus and Concepción de Maria. Each member village of the United Communities has a population locally estimated to number three to four hundred people, an estimated fifty to one hundred of whom are women at or beyond adolescence.[15] These small communities are fairly homogeneous regarding social customs and cultural mores. However, several aspects of Honduran history in recent years are of interest when assessing risk of cervical cancer in the region. Most notable is the recent increase in migration to and from these communities as families struggle with poverty. Seeking work, men have begun to travel with greater frequency to support their families. Some travel locally to work for large farms and others immigrate to cities for longer periods.[16] By and large, these migrations are transient and men return home, potentially bringing with them pathogens, such as HPV. A related component of this risk factor assessment is culturally entrenched machismo, an ideology of male dominance which is permissive of male promiscuity. Together these two factors create a potential for increased risk of sexually transmitted infections (STIs), including HPV, above what that risk may have been years ago.

Based on interviews, surveys and focus group sessions, it is clear that cervical cancer is the leading health concern of women in these communities.[15] Citing that significant numbers of mothers, sisters and friends die due to this disease, women enumerate multiple suspicions about the origins of the disease but have little in the way of knowledge about its actual etiology, prevention or cure. Many women attribute cervical

cancer to oral contraceptives and "bad air" but do not recognize the association between sexual practices and cervical carcinoma.

For the women of the CU, access to health information and care is very limited. Most women live nearly 40 kilometers from the nearest hospital and the nearest health post may be as much as a three-hour walk away. Physical distance is not the only barrier to this information and care however. After arriving at any one of these facilities both human and medical resources may be scarce. Thus, given the substantial burden of suffering from cervical cancer and as well as the high priority placed on it by community members, it is clear that prevention strategies continue to be ineffective. Exactly what form any new intervention might take must be both informed by the evidence and culturally relevant and feasible in this specific context.

II. Prevention Strategies

A significant burden is exacted by cervical cancer despite the existence of a wide number of prevention strategies, ranging from various screening methods to vaccinations, lifestyle changes, public education campaigns and policy changes. We began our analysis of screening methods and public education campaigns with a review of literature to date. Emphasis was placed on evidence specifically pertaining to the developing world, Latin America and Honduras, when available. Data bases searched included those of MEDLINE, USPSTF, WHO, PAHO, ACOG, ACS, FIGO and ACCP. Additional articles were reviewed from personal files.

Screening

Screening strategies include Papanicolaou smears (Paps), liquid-based cytology, computer-assisted cytology, HPV DNA testing and visual inspection with acetic acid (VIA). Liquid-based and computer-assisted cytology, as well as HPV DNA testing, are newer and relatively more expensive technologies. Several of these screening strategies are not appropriate to consider for use in this setting for a variety of reasons.

Although well-designed preliminary trials in developing countries suggest that HPV testing may eventually offer the possibility of greater sensitivity and specificity than traditional Paps at a reduced cost,[17,18] data are insufficient to make this the central focus of a cost-effective prevention strategy. Likewise, while the possibility for an effective HPV vaccine appears closer every day[19] it is also still too early to recommend vaccination as a central component of cervical cancer prevention in Honduras. Instead, we look closely at two well documented screening strategies, Paps and VIA, as well as public education programs. This focus is not meant to discredit the benefits that other prevention strategies offer but is instead done in an effort to comment on the research that currently exists that is most applicable to rural Honduran women. Clearly this focus may shift over the next several years as new technologies, especially vaccines, improve and become more widely available.

Due to the unique nature of each of the prevention strategies examined, we employ analytic techniques suited to both the literature available and the characteristics of the strategies themselves. Screening tests offer discrete quantitative outcomes such as sensitivity and specificity that can be easily measured. A wide body of literature currently exists that examines the differences in screening tests and their relative benefits and costs. In contrast, the implementation and evaluation of public education programs is more qualitative. The research community is still struggling with basic questions about how to approach research in this field. Uncertainties regarding the best study design to measure outcomes, and what exactly those outcomes are, present some of the challenges researchers in the field of community health face. Moreover, the breadth of work in this domain is much narrower. Thus, as we assess these different prevention strategies, our analytic tactics will be somewhat divergent.

Pap smears

Pap smears are considered the most successful cancer screening tool ever developed.[20] Much like childhood vaccinations, they are thought of as one of the preventive health victories of modern medicine. Although they have never been subjected to formal clinical trials to determine their effectiveness, Pap smears are considered to be responsible for the

decrease in cervical cancer incidence and mortality in many developed countries since their introduction sixty years ago.[21] This conclusion is based mainly on ecologic data gathered in Western Europe and the United States and has resulted in broad-based, well-organized screening programs in much of the developed and some of the developing world.

In spite of their wide acceptance, the accuracy of a Pap smear in being able to detect precancerous lesions varies quite widely. Many papers quote fairly divergent numbers for sensitivity and specificity. In review articles, values range from 6-87% for sensitivity and 80-100% for specificity.[2,4, 22,23] These figures range so widely in part because a Pap's accuracy varies with respect to what degree of dysplasia it is trying to detect. Moreover, accuracy is greatly affected by the adequacy of the sample, how it is fixed and stained, and the abilities of the cytotechnologist.[24] Efforts to improve the test's accuracy include liquid-based cytology and computer-assisted cytology, both of which are still being assessed in the developed world and lie far outside the financial reach of most developing countries. However, despite these variations in accuracy, there appears to be general agreement that high-quality Pap smears are very specific but that their sensitivity is variable.[2,22]

The efficacy and cost-effectiveness of Pap smears in decreasing mortality in the developed world is well documented.[22] However, this success has simply not been recognized in the developing world or more specifically in Honduras where incidence and mortality from cervical cancer has remained stagnant or slowly increased. Due, in part, to inadequacies of past and current programs, no efficacy data are available about Pap screening programs in Honduras.

VIA

VIA, sometimes referred to as DVI (direct visual inspection), offers a low-tech, low-cost method of screening for dysplasia. The process involves a standard speculum exam followed by visual inspection of the cervix one minute after washing it with a 3-5% acetic acid solution. Based on the presence of acetowhite changes, the provider can

recommend further treatment as needed. Because results of the screening are immediate, patients can sometimes be offered treatment immediately, removing the need for a follow-up visit.

Gaffikin *et al*.[25] conducted a thorough review to asses the performance of VIA in screening for cervical cancer. In what appears to be a well-designed meta-analysis, Gaffikin *et al.* examined 15 studies published between 1982-2000 to create a summary analysis of the available data regarding the test's sensitivity and specificity. Their results suggest that VIA's sensitivity ranges between 66 and 96% and that specificity ranges between 64 and 98%, making it comparable to traditional Pap smears. Despite this assessment of VIA's accuracy, one cannot overlook the fact that evidence regarding the long-term effectiveness or efficacy of VIA in reducing cervical cancer incidence or mortality does not currently exist. This is because VIA has not yet been used anywhere long enough to determine its effectiveness and head-to-head trials have not been completed in a low-resource setting.

Although efficacy data is not currently available, both Goldie et al.[18] and Mandelblatt et al.[26] developed models to assess the cost-effectiveness of various screening methods in low-resource settings. Goldie et al. found that screening programs in South Africa such as VIA or HPV DNA testing which can eliminate much of the need for colposcopy were much more cost-effective than more traditional cytology based programs. However, we will focus instead on Mandelblatt et al.'s findings as they seem more immediately applicable to Honduras. Although their model was developed based on prevalence and cost data relevant to Thailand, they use data from Honduras when data is lacking for Thailand. This pooled data was assumed to be reasonably valid as these countries have similar cancer rates and their populations are predominantly poor, rural and agricultural. The model compared the costs and benefits of seven screening techniques: VIA, HPV testing, Paps, and combinations of these three. In comparing these techniques, VIA was found to be the least expensive and saved the most women. VIA performed at 5-year intervals in women aged 35-55 with immediate treatment of abnormalities was found to cost $263 per LYS (life year saved). This is consistent with Goldie's findings as well.

Clearly, models have drawbacks. Implicit in the development of any model is the understanding that changes in the assumptions the model is built around can profoundly affect the results. However, Mandelblatt et al. found that sensitivity analyses which allowed for changes in assumptions about compliance with screening or treatment, or disease progression did not change the rank order of screening strategies. Their analysis also took into account the harms and costs of over-treatment resulting from low sensitivity of the screening tests. Despite these findings suggesting that VIA could be a viable alternative in less developed countries, there are still concerns. VIA does pose some major limitations in its low specificity, over-treatment of positively screened women and lack of standardization and quality control of both technique and training of providers.[27]

Public Health Education

Due to our new understanding of cervical cancer as being, in effect, a sexually transmitted disease, public health education is a relevant prevention strategy. This strategy can take many forms and approaches from mass-media campaigns to lay health worker (LHW) outreach work. Here, we will focus our attention on strategies that employ the use of lay health workers and community volunteers for reasons of applicability to our population. Because the villages of the United Communities lack access to mass-media, largely due to their geographic and technologic isolation, interventions that employ this approach are irrelevant to this population. Other methods of education such as provider counseling are also less relevant for this group, which often only accesses medical services when faced with an acute problem.[15] Such an encounter is generally not the forum for prevention education by providers. Thus, the natural fit for any education strategy aimed at these communities requires adapting to the geographic and technologic barriers that impact their access to information.

As with any strategy, we must begin with an assessment of the evidence regarding the benefits and harms of such an intervention. Performing such an assessment is challenging as few studies have been published using representative populations in

Honduras or even Latin America. Due to these constraints we must look to the literature focusing on groups within the United States that may be most comparable to this population. Programs targeted mostly to Latinas or low-income and underserved populations of minority women are evaluated through review articles and randomized controlled trials as best evidence when available. However, due to the insufficient quantity of evidence that applies to our target population, the quality of specific trials is assessed. It is through this analysis that many of the difficulties encountered in the evaluation of community based interventions are best illustrated and lessons can be learned for current program planning as well as future research.

Focusing on primary prevention strategies, a systematic review by Shepherd et al. published in 2000[28] evaluated the literature to date in order to determine the effectiveness of health education interventions to reduce sexual risk. The authors framed this evaluation as a study of primary prevention intervention strategies that would as a secondary benefit, lower the incidence of cervical cancer. They assert that, though none of the studies examined in the review specifically aimed to reduce the incidence of cervical cancer, the reduction of sexual risk would also reduce the transmission of HPV. Studies were rigorously analyzed for inclusion and standardized data extraction techniques were used by two independent reviewers. Ten percent of these results were then audited by a third party. All but one of the ten studies reviewed employed the Social Learning Theory for intervention development, and all but one targeted women of low socio-economic status. Results showed that effective interventions were multi-faceted in content and used peer educators with a variety of media at their disposal.

The effectiveness of using peer educators and alternative learning strategies has also been demonstrated to be effective in the promotion of secondary prevention strategies, specifically Pap smears. As the one trial published focusing on improving reproductive cancer screening through educational intervention in a Latina population, the randomized controlled trial of the *Por La Vida* Model is appraised here to highlight several key issues with regard to the design, implementation and evaluation of community based education interventions. In this study, researchers investigated the short term impact of a LHW

cancer screening education intervention when compared with controls.[29] Outcomes measured were improvements in utilization of screening. This model was designed to augment the existing social capital and link-person networks in the community to achieve its aims. Results showed a statistically significant improvement in practice of breast self exams ($p<0.001$) and utilization of mammography ($p=0.029$); increases in Pap smear utilization approached significance ($p=0.096$).

However, there were several design issues that call to question the validity of this study. First, the very presence of strong link-person networks makes the internal validity of the study questionable. While an asset for dissemination of information in a non- controlled environment, these links make it difficult to maintain randomization and to assess crossover events. There is no mention in the study of any attempts to assess such a phenomenon, and while the occurrence of crossovers would tend to bias results toward the null it cannot be assumed that the outcomes assessed would be accurately reported. For example, if there was a strong predilection in the community to want to please investigators, subjects may select the perceived "right answer" based on their assigned intervention group. Thus efficacy of the intervention cannot be truly assessed.

A second related issue, the reliability of measurement, is potentially biased. All measures were assessed through participant and LHW interviews. Within this construct, biases include recall, which could direct results toward or away from the null, and investigator pleasing reporting, as described above. Many women may also report on intended behaviors based on their intervention information. While this may accurately indicate changes in participants' desires, it may not translate into actual practices.

An additional design flaw, which may have borne out the intent versus practice question if designed differently, was the short follow-up period. With outcomes assessed no later than six months after the first intervention session, researchers may not have provided a sufficient interval for women to schedule and attend screening exams. The short follow-up period also does not allow for any investigation of the long-term sustainability of the effects of the intervention.

Overall, the *Por La Vida* (PLV) model appears culturally relevant and utilizes techniques to overcome information barriers. The selection and training of the LHWs to meet these ends was the main strength of this intervention. Unfortunately, methodological issues make the validity of the results questionable. However, we must ask whether these are actual design flaws or if the use of randomized controlled trials is truly capable of capturing the evidence for efficacy or effectiveness of community health interventions since the very components that may guarantee the success of the model, strong social networks for example, are incompatible with the design of our "best evidence" trials.

Another trial which highlights the paradox of the best evidence paradigm is a randomized trial conducted to evaluate the efficacy of a breast and cervical screening education intervention implemented by use of a Kokua group in Hawaii.[30] This group was able to show positive improvements in outcomes of Pap test compliance when compared with controls ($p<0.001$), but it was also unable to extract the effect of social networks and linkages among the exposed and unexposed because so much diffusion of information was occurring. However, the group notes that, "while such contamination is a problem for researchers, from the public health perspective, it represents a powerful tool."

These two trials illustrate several of the issues that researchers conducting the evaluation of community based approaches to public health education face. A body of literature exists that dissects these issues in great detail, the intricacies of which are beyond the scope of this discussion. However, to address some of the salient points, Twinn highlights some of the main issues in this evaluation debate through the examination of a cervical cancer screening education project based on the Health Belief Model.[31] Her assessment underscores the need for evaluation to include measures of process in addition to outcome. She further dissects the measures for these evaluations, noting that many assumptions are made that may not be culturally appropriate, such as what constitutes valid knowledge. Clearly, we face a dearth of understanding with regard to the complexities of designing, implementing and evaluating community intervention strategies.

III. Guidelines

Because incidence and mortality from cervical cancer have been shown to decrease with well-organized, population based prevention programs, numerous guidelines exist detailing how to organize such programs. In general, these programs focus on Pap smear screening because there are several decades of indirect evidence to support their use. However, which screening methodology (Pap, VIA, HPV-DNA testing) is most appropriate is highly dependent on the setting and resources available. Moreover, screening guidelines make up only one part of an effective prevention program. Without adequate patient education as well as access to quality follow-up care, screening, even well-implemented, is not effective in reducing the burden of suffering.

In the United States, professional medical organizations have developed guidelines regarding Pap screening, one component of an effective prevention program. Many of these guidelines have recently been updated due to increased knowledge about the natural history of cervical cancer and HPV infection, as well as to establish standards regarding some of the new screening tools (computer-assisted cytology, HPV screening, etc.). The most objective guidelines come from the United States Preventive Services Task Force (USPSTF), a body of medical and public health experts who develop evidence-driven recommendations. Their most recent guidelines recommend screening of all sexually active women with a cervix starting at age 21 or within 3 years of the onset of sexual activity; a later starting date than previous recommendations which suggested beginning at age 18. The recommended screening interval is at least every three years until a woman reaches 65 years of age when she is deemed to no longer need Pap screening due to her low risk of developing cervical cancer. These most recent recommendations represent a very significant change in the interval, which for years has been annual. However, the task force found sufficient evidence to recommend increasing the interval to every three years.[32]

These changes have been adopted in part by two major professional organizations, the American College of Obstetricians and Gynecologists (ACOG) and the American Cancer

Society (ACS), as outlined in Table 2. Although ACOG's August, 2003 recommendations support the same timing to initiate screening, they recommend annual cytology until women are 30 years old. After the age of 30, ACOG offers three screening possibilities: 1) screening every 2-3 years in women who have had 3 negative Paps; 2) annual cytology; or 3) cytology with HPV-DNA testing every 3 years, assuming both are negative. The ACS is even more proactive in its screening recommendations. Although their guidelines basically mimic those of ACOG, their recommended stopping age is 70, 5 years later than either USPSTF or ACOG. Because ACOG and ACS are organizations whose members benefit from increased screening, it is important to be hesitant in adopting their recommendations. At this time in the U.S., it seems most reasonable to adopt the more evidence-based guidelines released by the USPSTF and await further recommendations regarding new screening modalities.

Unlike those in the United States, guidelines released by international organizations for use in developing countries tend to be much less specific due to their recognition of the contextual issues that impact the ability for these guidelines to be adequately implemented. The International Federation of Obstetricians and Gynecologists (FIGO), the international partner to ACOG, does not make clear recommendations, stating only that cervical cancer screening should be population based, aim for at least 80% coverage and focus on cytology.[33] They further recommend that screening guidelines be country specific but do not explicitly state the ideal screening strategy. They do comment that cancer is rare before the age of 25, suggesting that screening before this age is unnecessary, and that screening is no longer needed in women over 65 who have had two negative smears in the past 10 years. Their only statement regarding the interval of screening is that there is a higher incidence of interval cancer if screening is extended beyond three years.

The World Health Organization (WHO) is looked to by many national governments and funding agencies to set policies for global health issues. Similar to FIGO, WHO is much less specific than US bodies in making recommendations for screening but does consistently highlight the importance of not only effective screening but also a full

prevention program which includes education as well as access to treatment and follow-up care.[27] WHO currently recommends Pap screening as the screening methodology of choice when resources allow it but also recommends VIA as a viable alternative in resource-poor settings. The Pan American Health Organization (PAHO) also focuses on the idea that prevention programs need to be comprehensive to be effective and that the setting in which they are implemented can impact which screening tools and intervals are most appropriate.[4]

These flexible guidelines are relevant as we consider the case of Honduras, where the Ministerio de Salud Pública (National Ministry of Health) recommends that women who are sexually active get a Pap smear every three years, especially once they are over thirty years old. Currently, screening exams are mostly carried out in public and private clinics throughout the country although services are clustered around more urban areas with infrequent "brigades" offering services in more remote rural areas.

IV. Implementation

Recommendations for prevention will remain ineffective as tools to reduce the burden of suffering exacted by this problem unless they are properly and widely implemented and women become empowered with the information necessary to understand and access quality care. In the U.S., where access to high quality care is the norm for a large segment, though not all, of the population, cervical cancer prevention through Pap screening has been widely implemented with great success. In 2004, two separate studies on the frequency of Pap screening in the U.S. examined the National Health Interview Survey, one of our best national tools for assessing general health information. Both found very high rates of coverage, with 93% of women reporting having had at least one Pap in their lifetime[34] and 83% reporting a Pap test in the past three years.[35]

Despite these seemingly impressive rates of coverage, both studies reported substantial areas of concern. Sirovich et al. found that many women, especially older women, are actually being over-screened. This raises significant concerns about adverse outcomes due to over-treatment, aside from unnecessarily incurred health care expenditures.

Although this over-screening is concerning, Hewitt et al.'s findings echo the findings of other researchers suggesting that certain subgroups of the population, namely poor women, less educated women and women with less access to health care, are perhaps being under-screened. More targeted investigations have also found significant differences in screening behaviors among Hispanic women that result in lower screening rates among these women.[36]

Extrapolating on these trends may provide some explanation of the disparities between nations. In Honduras, a large percentage of the population is characterized by low socioeconomic status and low education levels. Thus, one might expect to see lower screening rates in this setting relative to developed nations; just as populations in the U.S. with similar characteristics fall below screening rates seen in populations of their affluent counterparts. In a Honduran national health survey published in 2001, 60.9% of sexually active women aged 15-49 were found to have ever had a Pap smear.[13] In *Zona* 4, where the UC communities are located, 60.4% of sexually active women aged 15-49 reported ever having had a Pap smear, with 54.4% reporting one in the past year. Broken down by age, 44.2% of 20-24 year olds, 63.8% of 25-29 year olds, 75.7% of 30-34 year olds, 74.7% of 35-39 year olds, and 76.1% of 40-49 year olds reported having ever had a Pap smear. Based on a basic health survey carried out by the writers and colleagues in June 2003, women in the UC fit these trends as well. At that time, 56.7% of women of all ages reported having had a Pap smear in the last year, with rates significantly increasing when stratified by age.[14]

While Honduras may, on the whole, have a poorer and less educated population, screening trends still show variation by sociodemographic factors; much like they do in the U.S. At a regional level (*Zona* 4), only 44% of women with no formal education reported having ever had a Pap smear whereas 84.3% of women who had completed high school reported ever having had a Pap smear. Self-reported income also has an impact, as only 45.8% of women reporting low household income had ever had a Pap smear whereas 76.9% of women reporting a high household income had ever had a Pap smear.

Barriers to Implementation

These disparities in screening rates are well documented in the medical literature globally and reflect some of the barriers to universal adherence to guidelines. Regarding education, Lindau et al. found health literacy to be a better predictor of cervical cancer screening knowledge than ethnicity, and that poorly educated women are less likely to utilize services largely due to their lack of understanding of the disease process and the utility of screening methods to prevent morbidity and mortality.[37] While this study reported on trends seen in the United States, similar results are reported world-wide. In a Nicaraguan population that closely resembles the United Communities, Claeys et al. found inadequate screening status to be correlated with low educational level and lack of knowledge about prevention and symptoms of cervical cancer. Moreover, this lack of knowledge was found to be the reason cited by most women for their reluctance to be screened in the future.[38] In a recently published ethnographic study of the challenges to programming in the developing world, Hunter recounts her experiences researching a cervical cancer screening program in Iquitos, Peru.[39] She found that even when screening became more readily available to women in the area, the common understanding that the Pap was a test to identify cancer, rather than to prevent it, prevailed. Hunter attributes the persistence of this misunderstanding to the WHO's earlier approach to reducing the mortality burden, which promoted education about the warning signs of cervical cancer rather than education about the use of Paps as a screening strategy.[40]

In the United Communities, similar misconceptions exist. Eighty-six percent of women understand that cervical cancer can be detected by a test, but 18.8% believe it is a blood test, 20.3% a pelvic exam and 44.9% correctly understand it to be by a Pap smear.[14] Moreover, 47.8% of women believe that oral contraceptive pills, a fairly widely used family planning method in their communities, can cause cervical cancer.[14] Clearly, if a successful cervical cancer screening program is to be implemented in the setting of the United Communities where most women have about 2 years of formal education,[41] then it

must address these complex issues of both low screening adherence and low health literacy.

Education and knowledge barriers are not, however, the only barriers to a successful program. As was illustrated earlier, women with a lower self-reported income level are less likely to be screened than their wealthier peers. In a large qualitative survey conducted in five Latin American nations, Agurto et al. found that the main barriers to obtaining care cited by women were accessibility and availability of quality services, facilities that lack comfort and privacy, costs, and courtesy of providers.[42] These barriers echo the concerns of women in the United Communities as well[41] and are undoubtedly a significant hurdle which must be overcome if any nationwide effort to improve screening is ever to reach the thousands of rural poor who are most hindered by these issues of accessibility.

V. Recommendations

Making recommendations for a comprehensive program to reduce the incidence and mortality of cervical cancer must consider the prevention strategies available as well as the barriers to effective utilization of such technologies. The Program for Appropriate Technologies in Health (PATH) and the Alliance for Cervical Cancer Prevention (ACCP) recently released recommendations for program planning, implementation and evaluation, *Planning Appropriate Cervical Cancer Prevention Programs, 2nd Edition,*[43] as a framework for public health planning in developing countries. Their recommendations are broad based, and suggest that an effective program should be multidimensional. They further describe these recommendations, recommending that programs should 1) build on strengths already existent and act to ensure sustainability of the program; 2) involve community members at as many levels of program design, implementation and evaluation as possible; 3) coordinate services to ensure ease of accessibility and use, including recognizing inadequate infrastructure as well as policies that may preclude access and good service delivery; 4) provide adequate training for all providers, including counseling skills to ensure quality services are delivered. The

guidelines also suggest that the program employ innovative means to reach those women who are known to be at risk and underserved.

These recommendations provide a framework for the design of a successful program aimed at alleviating the burden of suffering in the specific population of the United Communities. Working within this framework, we recommend a three-pronged approach involving enhanced screening; public health education; and increasing availability of and access to high quality follow-up care.

As mentioned previously, the Honduran Ministry of Health recommends Pap smears every three years for women who are sexually active, especially once they reach the age of thirty. Although VIA has been shown through modeling to be a cost-effective screening modality in low-resource settings, we do not recommend its use at this time. Relative to Pap smears, there is simply less efficacy data and more concern about over-treatment. Moreover, despite much misinformation about cervical cancer, women in these communities do seem to have a general understanding that Pap smears are important and should be done. It is unclear how changing screening modalities now would affect their adherence to screening recommendations. Clearly, research on VIA should proceed, and governmental and non-governmental agencies alike should be willing to reconsider their recommendations once additional information is released. In rural, poor settings, VIA does offer advantages. No laboratory facilities are required for analysis, and providers are able to provide immediate answers regarding the need for follow-up. For women who are often traveling significant distances to be screened, such efficiency is invaluable.

Education is the second, fundamental part of an effective prevention program. Women need basic information about cervical cancer, risk factors and its association with HPV but not with contraception. They need to understand that screening is not the same as treatment, but that treatment does exist. Based on the current research, it is clear that this component of the program needs to build on the current strengths of the United Communities, mainly by bolstering the organization of the lay health workers. As community members, lay health workers are much better positioned to utilize existent

social networks and present information in culturally appropriate ways. They are more readily responsive to the needs expressed by community members. Their participation also helps to ensure sustainability by promoting a community-driven approach and will facilitate the integration of cervical cancer prevention education into the current health infrastructure.

Finally, the integration of services is fundamental to ensuring that high quality services are available and accessible. Women must have access, both physical and financial, to treatment, and they must have the education and motivation to seek out this care. Through collaboration with other members of the health system, services already available at the regional and national level can be utilized by these women for follow-up. However, follow-up is a major weakness of the current Honduran prevention program. Despite a moderate amount of adherence to screening recommendations, women report never receiving their results and clearly lack a very basic understanding of what the results mean when they do receive them.[13, 15, 51] The critical link between screening and follow-up treatment is the delivery of Pap results, and this link is requisite to the realization of any effect from increased screening efforts. Moreover, a program's effects may only be maximized when the delivery of results is coupled with counseling for any follow-up necessary, and a strategy designed for these women to access follow-up services, including creative approaches to financing care, is in place.[44]

VI. Discussion

Through this analysis, several important realities regarding the prevention of cervical cancer have been described. On a global scale, the burden of this disease weighs disproportionately on the developing world in terms of both morbidity and mortality. At the national level, though, disparities exist along socioeconomic lines in developing and developed nations alike.

Implicit in these disparities are both promise and concern. Fortunately, cervical cancer is one of the few preventable and curable cancers, due in large part to the existence of excellent screening and treatment strategies. A triumph of public health, Pap smears,

when performed widely and well and paired with appropriate follow-up care have reduced the burden of suffering due to cervical cancer significantly. However, while the promise of such strategies has been realized in developed nations, especially in the upper echelons of society, a significant prevention gap still exists both within the United States and between nations around the globe.

To close this gap, public health strategists, governments, funding agencies, clinicians, local leaders and community members must work to transform these prevention strategies into appropriate practices. Designing and implementing programs which are comprehensive in scope can potentially position populations to overcome many of the known barriers to care. Such a multi-faceted program aims to influence not only social factors, such as cultural barriers, lack of education and socioeconomic status, but also infrastructural determinants such as availability of screening services, high quality of follow-up care and transportation. In so doing, a comprehensive program can potentially transform a prevention strategy into appropriate, accessible and applied practices capable of alleviating the burden of this disease.

Table 1: Outcomes Table for Cervical Cancer Screening Tests: data from analyses of tests used in the Developing World

Test	Sensitivity	Specificity	Estimated cost to perform test (USD)*	Cost-Effectiveness Ratio ($/LYS)	Reduction in Invasive Cervical Cancer Incidence	Reduction in Invasive Cervical Cancer Mortality
Pap	30-87%[22]	86-100%[22]	$9.38	$3,168 ** $1,459 ***	18.8% 10.8%	23.2% 13.5%
VIA	66-96%[25]	64-98%[25]	$2.05	$548 ** $263***	30.8% 52.4%	34.9% 58.2%

* These figures come from the model developed by Mandelblatt et al. in Thailand but is thought to be appropriate for Honduras as well. These costs include personnel and supply costs as well as the cost of the patient's time.
** From Mandelblatt et al., these figures are based on screening women 20-70 years old with Pap or VIA with immediate treatment every 5 years.
** From Mandelblatt et al., these figures are based on screening women 35-55 years old with Pap or VIA with immediate treatment every 5 years.

Table 2: Guidelines for best practice: Cervical Cancer screening

Organization	Start	Frequency	Stop
USPSTF (2003)	• w/in 3 yrs of onset of sex or by 21 yo (A)	• <30 yo: @ least q 3 yrs (A) • >30 yo: same	• @ 65 yo if recent normal Pap (D)
ACOG (2003)	Same as USPSTF	• <30 yo: annually • >30 yo:1) q 2-3 yrs if 3 consecutive normal Paps, 2) annually, or 3) Pap w/HPV-DNA q 3 yrs	• Patient dependent (C)
ACS	Same as USPSTF	• <30 yo: 1) trad Pap annually Pap, or 2) liquid-based Pap q 2 yrs • >30 yo: q 2-3 yrs if 3 consecutive normal Paps	• @70 yo if 3 consec NL Paps & not abnormal in last 10 yrs

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