

CERVICAL CANCER PREVENTION AND CONTROL IN DEVELOPING COUNTRIES: A MODEL PROGRAM^{1, 2}

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Important obstacles confronting cancer screening programs in developing areas have been dealt with successfully by a national cervical cancer screening program in Brazil. This article describes the history and principal features of that program.

Introduction

A simple review of Brazilian statistics suffices to show the magnitude of the national cancer problem—part of a worldwide problem that constitutes a veritable scourge of humanity, and that appears most severe in the economically developed countries or those where development is well underway (18, 22).

The difficulty of coping with cervical cancer is aggravated in Brazil by the country's size, large population, and hard-to reach areas, as well as by shortages of manpower and material resources. To help deal with the cancer problem, the Brazilian Government has established a systematic health structure in every state under the control of the Ministry of Health's National Cancer Division, with decentralized implementing authority being vested in some 120 specialized institutes of the National Cancer Control Program (17).

Analysis based on the 1976 National Cancer

Control Program Report has shown that the cancer with the highest incidence in Brazil is cancer of the uterine cervix, which occurs most commonly in the poorer parts of the north, northeast, and west-central regions (23).

Although the incidence of cervical cancer is lower in the southern and southwestern regions relative to other types of cancer, it is nevertheless a serious social problem in those areas, especially in view of heavy migration from poor regions to the great urban centers.

In this vein, reports from 23 health posts on the outskirts of the city of São Paulo indicate that the incidence of dysplasias and carcinoma in situ has been markedly higher at posts serving poorer people and recent immigrants. However, once migrants from the same regions have become adjusted, and once their hygienic and living conditions improve, their incidence of cervical cancer declines.

All this points up the obvious need for health education, census work, cervical cancer screening, and provision of social assistance to vulnerable population groups in accordance with their needs.

Initial Program Considerations

Efforts to establish cancer prevention and control programs in developing countries, such as those of Latin America, face two great obstacles. The first is lack of knowledge of the situation, owing to a scarcity of data on such

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essential matters as cancer incidence, the status of the disease upon diagnosis, and how cases arise (22). In this regard, it is worth noting that more than 60 per cent of the cervical cancer cases diagnosed in Brazil are at an invasive stage. According to the *Registro Nacional de Tumores*, the incidence of these tumors is higher in undeveloped parts of the country that lack medical resources (26).

The second obstacle is a shortage of manpower and material resources, typical of all developing countries, that must be overcome. This problem was confronted by ourselves in Brazil during planning and development of the Cervical Cancer Prevention and Detection Program in the early 1970s. This difficulty, amplified by Brazil's special size, population, and accessibility problems, made it essential to develop a program methodology that would be easy to apply and could utilize the scarce manpower resources that were available. Consequently, we adopted an approach structured so that control was centralized in a central laboratory and base hospital, while execution was decentralized—being performed by already existing health units and medical schools.

Since cervical cancer preferentially attacks women who are still young and still playing key family and community roles, our principal objective was to detect precancerous lesions (dysplasias) or preinvasive cancers (carcinoma in situ) early enough to permit a complete cure in all cases. Therefore, we sought to develop a low-cost high-yield approach that could be used throughout Brazil to screen for cancer of the cervix—and also for breast cancer.

Accordingly, in 1970 we inaugurated a new working methodology in coordination with the municipal authorities of São Caetano do Sul, a city in the vicinity of São Paulo with a recorded population of 170,675. This undertaking received advisory support from the Pan American Health Organization and from a special commission established by the São Paulo State Health Department. An initial

screening of 15,000 women over 20 years of age for cervical cancer detected suspected or positive cases (dysplasias or carcinomas) in 1.54 per cent of those examined. A second screening, conducted two years later, yielded results indicating that this rate had fallen to 0.38 per cent. Overall, screening of 39,633 women in São Caetano do Sul detected 828 suspected or positive cases, all of which received treatment.

A virtually identical project was implemented in 1975 in São Bernardo do Campo, a city with some 267,038 inhabitants and socioeconomic conditions analogous to those in São Caetano do Sul. Overall, 30,143 women were screened and 604 suspected or positive cases of cervical cancer were detected.

On the basis of these experiences, we developed a practical working methodology for cervical cancer screening that is applicable throughout Brazil and in other developing countries.

In parallel with this cervical cancer screening, and taking advantage of the structure already established for that purpose, we carried out breast cancer screening that included a clinical examination and mammography when indicated. Overall, during 1978–1980 a total of 157,295 asymptomatic women over 20 years of age were examined for breast cancer, these being the same São Paulo area patients examined for cervical cancer in this period (see p. 218). A total of 204 incipient or previously undetected breast cancers, some in a preclinical phase, were found in these women. On the average, one cancer was detected among every 192 women over 45 years of age, and one was detected among every 1,981 women in the 20–45 year age group. These results are comparable to the results obtained by Strax (23, 24).

Methodology

The methodology we have employed since 1972, and that we support here as being eminently applicable, is characterized by an

integration of efforts and resources that avoids any duplication of activities in the same area that could raise the program's cost and work against the national interest. Other elements of this methodology include:

- 1) creation of an information-gathering system that records each patient's name, age, race, marital status, social welfare status, schooling, and sexual behavior;
- 2) utilization of existing facilities such as health posts, medical schools, hospitals, other institutions, etc.;
- 3) centralization of certain screening work in a central laboratory of cytopathology and pathological anatomy and a base hospital;
- 4) decentralization of outpatient services—smear collection and preliminary examinations—so that these can be performed by federal, state, and municipal health units strategically located in densely populated low-income areas;
- 5) utilization of personnel who lack general medical backgrounds, but who are especially trained to provide primary care and triage;
- 6) preparation of professionals specializing in all phases of oncology;
- 7) provision of specialized health education for the lay public in a community setting;
- 8) provision of social welfare services that will ensure education of the community, follow-up of all suspected or positive cases, and adequate treatment;
- 9) physical and psychological rehabilitation for patients undergoing surgical operations.

With this methodology and philosophical approach, evolved during the forementioned projects, in 1976 we proceeded to develop a broad screening program on the outskirts of the city of São Paulo, with the goal of screening 100,000 women per year.

Program Development

In accord with our resource coordination policy, we placed screening posts in 23 state and municipal health centers. Care was pro-

vided by the program's own appropriately trained auxiliary personnel acting under a physician's control and supervision.

Screening Levels

At these posts, where primary care referred to as "level 1" screening was accomplished, the patient was registered; material for a cervical cytology examination was collected; the neck of the uterus was inspected; and the breasts were palpated to detect tumors, ulceration, or discharge for the purpose of detecting cases that should be seen by a physician in order to receive what we refer to as "level 2" care.

This triage work carried out by nonmedical personnel is extremely useful, since it permits screening of great masses of people, a task that the scarce physicians in developing countries would find impossible to perform alone. The accuracy of this work, as attested by our experience, has been highly satisfactory. At present we are extending the work to inspection of the mouth and skin to screen for lesions leading to a diagnosis of cancer of those areas.

Level 2 care is provided by a specialized physician at the main outpatient clinic. Each patient receives a complete gynecological workup—including a colposcopy, Schiller's test, and breast palpation. If necessary, a biopsy is performed.

Finally, if indicated, a third-level examination is performed. This includes a mammography, thermography, and ductography, as well as a biopsy if needed.

Manpower Training

Preparation of professionals trained to provide care at all these levels is essential in order to overcome the existing shortage of such personnel.

In addition to providing courses on colposcopy and cytopathology for physicians, it is important to train a sufficient number of cyto-technologists capable of implementing the

program being envisaged. These technicians are responsible for carefully screening slides received from peripheral outpatient clinics and selecting those showing some abnormality requiring examination by a cytopathologist. Again, this work is of great importance because it permits the impact of the physician's work to be multiplied many times.

A well-trained cytotechnologist can screen 60 to 70 slides per day, of which 7 to 10 per cent are typically considered suspect or positive, depending upon the worker's degree of assurance. This number of slides, which might appear excessive for one person, is in fact beneficial by virtue of the increased training involved. To the degree that the cytotechnologist proceeds to acquire increased confidence, the precision of his work will improve and the percentage of slides separated and marked for further examination will decline.

In addition to the requisite skills involved, the cytotechnologist's work requires an ability to remain seated before the microscope for long periods as well as a stable temperament, persistence, and good eyesight. For these reasons, upon starting our first cytotechnologist training course we suggested that paraplegics be included, since the work did not require use of the lower extremities. Because of the implications for these trainees, the decision to prepare and employ paraplegics was not taken lightly. However, once convinced that we were on the right track, we proceeded to select young paraplegics of both sexes from various institutions on the basis of their educational background and psychological makeup.

Now, following the provision of six courses (up to 1980) that trained 65 cytotechnologists, we are convinced that our action was correct and that paraplegics are ideal for this type of work. After they have come to terms with their handicap, those we worked with have shown perseverance, strength of character, and a strong desire to succeed professionally that has given them fine decision-making ability.

The training course given to them runs two years and occupies six hours per day. The first year, which provides fundamental training, is devoted to cytopathology of the uterine cervix—thereby permitting the trainees to participate in effective screening activity. The second year, which provides more advanced and specialized training, addresses the subjects of pulmonary cytology, discharges, and other matters.

Community Education

Education for the lay public about factors relating to cancer was cautiously provided to groups in small communities that had access to appropriate care. We considered that large-scale use of the mass media for this purpose, without providing for adequate care on a long-term basis, was potentially dangerous and contraindicated—because it could alert large numbers of people to the problem's importance without providing access to appropriate care.

Our current program includes daily lectures to those attending our main outpatient clinic and to small community groups. These activities seek to reduce cancer's image as a merciless killer by pointing out that the disease is curable if detected early and given adequate treatment.

Social Work

The social welfare service plays a vital role in the program by supplying information on cancer prevention, registering patients, providing follow-up, and guiding patients toward adequate treatment. When screening reveals a positive or suspected case, the service sends letters to the patient. If necessary, home visits are also made. The service's work of checking outpatient attendance is indispensable for guaranteeing follow-up of positive cases and minimizing the number of patients lost to treatment.

Mobile Units

Mobile services can be helpful. We use them for promotional purposes, and also to cover suburban or rural parts of areas that possess a permanent outpatient facility that receives patients' registration forms and the material collected from patients on a daily basis. Nevertheless, the distances covered by mobile units should be short, and the units should be subordinated to the fixed outpatient clinic, which is linked to the central base hospital. For example, a project we are developing in the small region of Assis (a city in the central portion of São Paulo State) covers a radius of 80 km. This project utilizes a mobile unit that should be linked to four permanent outpatient facilities—two of which have already been established. This has permitted our program to reach rural areas without detracting from the permanent character of the services involved. During its initial phase, this project examined 8,245 women and detected 104 suspected or positive cases.

Our experience with transitory or periodic mobile unit campaigns, where units traverse the country without leaving a permanent outpatient clinic in each locale, is that such campaigns are ineffective. Hence, programs of a permanent nature must be developed in each region, and these must be interconnected and affiliated with a central agency that has control over all of their activities.

Cooperation with Paraguay

In accord with our policy of cooperative use of resources and good neighborliness, we developed an extensive cervical cancer detection and prevention program in Asunción, Paraguay, during the period October 1978-April 1979. Two level 1 and one level 2 outpatient services were established at the Asunción cancer hospital and the medical service of the Ministry of Health. Smears, biopsy specimens, and patient registration forms were sent weekly to our base hospital for final diagnosis,

Table 1. Results of a cervical cancer screening program conducted in Asunción, Paraguay (October 1978-April 1979), in terms of cytological findings listed according to WHO cytological classification categories (IIIa = slight dysplasia, IIIb = moderate dysplasia, IIIc = severe dysplasia, IV = carcinoma in situ, V = invasive carcinoma) (11, 16).

Patients examined: 8,344
 Patients with negative results: 8,216
 Suspected or positive cases detected: 128 (1.53%)

Classification of suspected or positive cases					
IIIa	IIIb	IIIc	IV	V	Total
67	15	9	24	13	128

and the results were reported back to the Asunción cancer hospital, where the patients received adequate treatment. Overall, 10,000 examinations were performed and 128 suspected or positive cases were detected (Table 1).

The purpose of this program was to stimulate, develop, and assist cancer control activity in Paraguay, to a point where the country would continue conducting this activity on its own. At present, the established program is continuing under the supervision of two Paraguayan physicians.

Statistical Analysis

The previously mentioned pilot program carried out in São Caetano do Sul demonstrated the value of our procedure—through data collected on the prevalence and annual incidence of dysplasias and cervical cancers in that city. Specifically, these data showed a marked reduction in the total number of cases considered suspect or positive in this population, a trend also observed in surveys conducted after program implementation elsewhere—by Koss and Christopherson in New York and Louisville (4, 10).

Altogether, combining the pilot and other programs, over the years 1970-1980 our cancer screening activities provided coverage for 407,139 patients (see Table 2), performed 513,496 cytological examinations, and carried

Table 2. Women screened and suspected or positive cases of cervical cancer detected, by screening activities conducted within the context of the national program, 1970-1980.

Region involved	No. of patients registered	No. of suspected or positive cases found
Santo Amaro	2,194	93
São Caetano do Sul	45,316	954
São Bernardo do Campo	39,318	802
São Paulo (city)	31,003	735
Outskirts of São Paulo	216,882	3,190
Prenatal services (city of São Paulo)	36,440	284
Assis	14,076	175
Ilha Bela	90	3
Piraju	1,996	19
Paraguay (October 1978-April 1979)	8,344	128
Women's prison, São Paulo (August 1978)	346	13
Pindamonhangaba	2,424	19
Itapeva	1,059	8
Praia Grande	138	2
Santos	962	37
Bauru	1,006	9
Santo André	5,545	99
Total	407,139	6,570

out 23,237 biopsies. Thanks to our educational program, increased public awareness encouraged through meetings, and growing interest on the part of the medical community, it was possible to obtain a progressive annual increase in attendance, as shown in Table 3.

Table 4 shows the number of positive cases detected according to their cytological classification. In general, the number of severe dysplasias (category IIIc) and carcinomas in situ (category IV) was approximately double the number of invasive carcinomas. Again,

Table 3. Suspicious or positive cytological findings, by year (1970-1980).

Year	No. of patients registered	Suspected or positive cases	
		No.	%
1980	82,278	1,435	1.74
1979	86,485	1,038	1.20
1978	86,470	1,208	1.40
1977	72,814	1,091	1.50
1976	26,798	506	1.89
1975	17,768	531	2.99
1974	11,428	208	1.82
1970-1973	23,098	553	2.39
Total	407,139	6,570	1.61

Table 4. Status of suspected or positive cases, as indicated by cytological examination.

Year	No. of cases in each classification category ^a					Total No. of cases
	IIIa	IIIb	IIIc	IV	V	
1980	710	287	62	211	165	1,435
1979	553	168	79	134	104	1,038
1978	719	172	73	146	98	1,208
1977	608	188	82	128	85	1,091
1976	271	99	40	49	47	506
1975	290	89	39	47	66	531
1974	122	37	17	15	17	208
1973	196	62	28	54	27	367
1970-1972	100	32	16	14	24	186
Total	3,569	1,134	436	798	633	6,570

^aCytological classification: IIIa = slight dysplasia; IIIb = moderate dysplasia; IIIc = severe dysplasia; IV = carcinoma in situ; V = invasive carcinoma.

Table 5. Status of suspected or positive cases detected by the main program screening women on the outskirts of São Paulo.

Year	No. of patients registered	No. of cases in each classification category ^a					Total cases	
		IIIa	IIIb	IIIc	IV	V	No.	%
1980	46,635	435	187	40	142	114	918	1.97
1979	50,224	267	81	40	76	65	529	1.05
1978	55,841	446	112	51	106	64	779	1.40
1977	53,119	457	137	62	94	54	804	1.51
1976	11,063	82	31	12	29	6	160	1.45
Total	216,882	1,687	548	205	447	303	3,190	1.47

^aCytological classification: IIIa = slight dysplasia; IIIb = moderate dysplasia; IIIc = severe dysplasia; IV = carcinoma in situ; V = invasive carcinoma.

this demonstrated the great value of early detection followed by proper treatment.

The need for such detection is also supported by the results of a survey conducted in the city of São Paulo that have shown a cervical cancer incidence of 1.05 to 1.97 per cent (Table 5). Other surveys conducted in Chile and the United States (5) have demonstrated the importance of cervical cancer in Latin America, where the incidence of the disease reaches the highest levels in the world.

Cytological and Histopathological Findings

Table 6 compares the results of cytological examinations with those of subsequent biop-

sies. That comparison indicates that the accuracy of the cytological diagnosis increased with the seriousness of the case. The fact that cytological diagnoses of carcinoma in situ and invasive carcinoma were confirmed 73 and 68 per cent of the time, respectively, demonstrates the value of the cytological screening method.

Significantly fewer cytological diagnoses of severe dysplasia were confirmed, a fact partly attributable to the difficulty of distinguishing between severe dysplasia (category IIIc) and carcinoma in situ (category IV) (9). Table 6 also shows that a significant number of patients cytologically diagnosed as positive yielded negative biopsies. Nearly all of these patients were initially diagnosed as having

Table 6. Comparison of cytological findings and target biopsy diagnoses for 1,039 cases. The 1,039 biopsies shown do not include all the biopsies performed at the Brazilian Cancer Control Institute, but rather biopsies of selected cases with a complete two-year follow-up.

Biopsy results	Cytological findings, by classification category ^a					Total
	IIIa	IIIb	IIIc	IV	V	
Negative	193	39	12	20	20	284
Slight dysplasia	114(34%)	36	6	3	—	159
Moderate dysplasia	21	114(50%)	16	10	—	161
Severe dysplasia	5	31	52(50%)	24	1	113
Carcinoma "in situ"	3	10	18	174(73%)	21	226
Invasive carcinoma	—	—	1	6	89(68%)	96
Total	336	230	105	237	131	1,039

^aCytological classification: IIIa = slight dysplasia; IIIb = moderate dysplasia; IIIc = severe dysplasia; IV = carcinoma in situ; V = invasive carcinoma.

slight dysplasia (category IIIa), a fact that points up the difficulty of distinguishing cytologically between incipient dysplasia and an inflammatory process. Nevertheless, Melamed (12) and Hulka (8) have found that a high percentage of patients with atypical smears (definable as slight dysplasia in our classification) subsequently developed frank dysplasia. In addition, diagnoses of slight dysplasia also led to detection and treatment of other inflammatory conditions in a significant number of cases. Therefore, we have preferred to adopt a procedure that produces a relatively high percentage of so-called false positive diagnoses but which picks up more cases in serious need of treatment (3).

Following the same rationale, and in order that the screening method be sensitive, the percentage of false negative diagnoses should be reduced to a minimum. To help determine whether this was in fact the case, a control study was made of a group of 4,415 women who, despite negative cytological results, were given a colposcopy; 889 of these examinations led to subsequent biopsies. Overall, 21 of these 889 biopsies revealed dysplasias or carcinoma in situ, indicating a false negative rate of 0.51 per cent (Table 7). This rate compares favorably with rates found in the literature that range from 2.8 to 30 per cent (1, 2, 6, 7, 13, 14, 15).

Table 7. "False negative" cytological diagnoses revealed by subsequent target biopsies. (Of 4,145 women examined, 889 were biopsied.)

Cytological classification categories	No. of false negative diagnoses	% false negative errors
IIIa	13	0.31
IIIb	2	0.05
IIIc	2	0.05
IV	4	0.10
V	—	—
Total	21	0.51

Discussion

Overall, the program has proved to be effective. For example, over one two-year period 168,000 women were screened and 1,540 cases of dysplasia and carcinoma in situ were detected. As previously noted, all available medical resources were used; the principal screening method used was cytological examination, though colposcopy was also employed in cases where cytology indicated dysplasia, carcinoma in situ, or invasive carcinoma (19).

Comparison of histopathological diagnoses with the cytological findings showed the accuracy of the cytological diagnoses to be quite satisfactory.

The quality of the slides prepared by especially trained auxiliary personnel was very good, and it is highly recommended that such personnel participate in similar programs. In this vein, it should be noted that the large number of women screened daily provides abundant material for training cytopathologists as well as cytotechnologists working at the intermediate level—both of whom are essential for the program's development and expansion. In addition, the concentration of patients with dysplasia, carcinoma in situ, and invasive carcinoma provides an excellent opportunity for intensive training in colposcopy, another technique that is fundamental to the detection and prevention of cervical cancer.

Concluding Remarks

The cancer problem, serious in all parts of the civilized world, is complicated in Brazil by the country's size, hard-to-reach areas, and lack of human and material resources. For these reasons among others, all Brazilians, particularly those in specialized services, should work together as best they can to confront the problem.

Cervical cancer rates particular priority, not just because it is the most common form of cancer in Brazil but also because it attacks

women who are still young, depriving them of many years of useful life. In addition, cervical cancer can be prevented if dysplasia or carcinoma in situ is detected before the invasive stage is reached.

As this suggests, early detection and prevention of cervical cancer is the first step—and the key—to controlling the disease. To be feasible, however, any mass cervical cancer prevention and detection program must be low in cost, must avoid duplication, must be readily applicable to a variety of situations, and must employ sensitive methods that miss few cases (i.e., that produce few “false negative” results). In addition, all the available human and material resources should be used in a well-coordinated manner, and provision should be made for increasing them as needed. The training and effective utilization of auxiliary personnel is especially important in Brazil, because of the country’s current shortage of physicians. Our extensive experience with this type of program has demonstrated that auxiliaries can be effective and very useful.

Another point is that the program should be developed as a community activity serving relatively small population groups, principally ones in the most densely inhabited and

neediest areas. These local activities must be integrated into a structured framework that will ensure both centralized coordination and decentralized implementation of the program.

Regarding health education, such education is needed to inform the public about the possible benefits of early cervical cancer prevention and detection, and to promote the idea that this is a curable disease. Such lay education should be directed at small groups with access to health care. Broad informative or educational campaigns conducted through the mass media are contraindicated, because they will alert large numbers of people and cause them to seek medical care that cannot be provided on this scale.

In general, the cancer screening conducted must be performed through efficient and continuous activities rather than through temporary national campaigns, and the national program should merely be the sum total of small-scale regular activities conducted in the communities served. It is also essential that patient records and information be maintained for continued evaluation of the activities performed, and that all suspected and positive cases be followed up so as to prevent contact with patients in need of treatment from being lost.

SUMMARY

Efforts to establish effective cancer screening programs in Latin American countries must be able to cope with a shortage of information about the nature and extent of the cancers involved as well as shortages of skilled manpower and personnel. Both of these problems have been dealt with effectively by a cervical and breast cancer screening program that has been underway in Brazil since the early 1970s.

The program has focused primarily on cervical cancer, which is the cancer of highest incidence in Brazil, and has concentrated on detecting incipient cases early while they are still easy to cure. Basically, the program maintains decentralized screening activities in numerous facilities serving high-risk areas, while at the same time concentrating administrative control and final diagnostic procedures at a

main outpatient center and base hospital. It also makes extensive use of auxiliaries lacking general medical backgrounds during the initial large-scale screening procedures; helps train cytotechnologists and physicians specializing in oncology; gives low-key health education about cancer to selected segments of the lay public; and provides social welfare services to promote community education, ensure follow-up of detected cases, and guide patients toward adequate treatment. The program also provides physical and psychological rehabilitation for patients following surgical operations.

Overall, during the 1970-1980 period the program screened 407,139 women, performed 513,496 cytological examinations, did 23,237 biopsies, and diagnosed 6,570 suspected or positive cases of dysplasia, carcinoma in situ, or invasive car-

cinoma. Surveys in areas covered by the program have shown marked declines in the rate of suspect or positive cases over time, demonstrating the program's success in those areas. Partly because the program was designed specifically for applicability

to a wide range of diverse situations, there is good reason to believe its procedures could prove applicable to many other parts of Latin America and the developing world.

REFERENCES

- (1) Berg, J. W., and G. M. Bader. The present potential of exfoliative cytology in the detection of cervix cancer. *Cancer* 11:758-764, 1958.
- (2) Bonilla-Musoles, F. *El cuello uterino y sus enfermedades*. Ed. Jims, Barcelona, 1978, p. 155.
- (3) Christopherson, W. M., and J. E. Parker. A critical study of cervical biopsies including serial sectioning. *Cancer* 14:213-216, 1961.
- (4) Christopherson, W. M., J. E. Parker, and J. C. Drye. Control of cervical cancer: preliminary report on community program. *JAMA* 182:179-182, 1962.
- (5) Ministerio de la Salud Pública (Chile). *Detección del cáncer cervico-uterino: Simposio internacional*. Ministerio de la Salud Pública, Santiago, Chile, 1971.
- (6) Dockery, J. L., Jr., and J. H. Ferguson. The screening of apparently benign cervical lesions. *Am J Obstet Gynecol* 82:1277-1281, 1961.
- (7) Griffiths, C. T., and P. A. Younge. The clinical diagnosis of early cervical cancer. *Obstet Gynecol Surv* 24:967-975, 1969.
- (8) Hulka, B. S. Cytologic and histologic outcome following an atypical cervical smear. *Am J Obstet Gynecol* 101:190-199, 1968.
- (9) Kaufman, R. H., W. A. Johnson, H. J. Spjut, and A. Smith. A correlated cyto-histopathologic approach to the rapid diagnosis of cervical atypias. *Acta Cytol* 11:272-278, 1967.
- (10) Koss, L. G. Significance of dysplasia. *Clin Obstet Gynecol* 13:873-888, 1970.
- (11) Pan American Health Organization. *Manual of Norms and Procedures for Cervical Cancer Control*. PAHO Scientific Publication 248. Washington, D.C., 1972.
- (12) Melamed, M. R., and B. J. Flehinger. Non-diagnostic squamous atypia in cervico-vaginal cytology as a risk factor for early neoplasia. *Acta Cytol* 20:108-110, 1976.
- (13) Ostergard, D. R., and B. Gondos. The incidence of false negative cervical cytology as determined by colposcopically directed biopsies. *Acta Cytol* 15:292-293, 1971.
- (14) Parker, R. T. The clinical problems of early cervical neoplasia. *Obstet Gynecol Surv* 24:684-697, 1969.
- (15) Richart, R. M. Evaluation of the true false negative rate in cytology. *Am J Obstet Gynecol* 89:723-726, 1964.
- (16) Riotten, G., and W. M. Christopherson. *International Histological Classification of Tumors, No. 8: Cytology of the Female Genital Tract*. World Health Organization, Geneva, 1973.
- (17) Sampaio Goes, J., Jr. *Programa nacional de controle do câncer*. Ministério da Saúde (Programa Nacional de Controle do Câncer, Divisão Nacional de Câncer), Brasília, 1973.
- (18) Sampaio Goes, J., Jr., and R. A. Estevez. *Manual para o Controle do Câncer na América Latina*. Fundação "Centro de Pesquisa de Oncologia," São Paulo, 1976.
- (19) Sampaio Goes, J., Jr., J. C. Machado, S. B. Zyngier, and L. R. Pinheiro. *Uterine Cancer Detection and Prevention in a Large Female Population: Prevention and Detection of Cancer (DEPCA)* (vol. 2). H. E. Neiburgs, New York, 1978, p. 24.
- (20) Sampaio Goes, J., Jr., and J. C. G. Sampaio Goes. Programa de prevenção do câncer na periferia da grande São Paulo. *Anais XXIII Jornada Bras Ginec Obstet* 28:64, 1977.
- (21) Sampaio Goes, J., Jr., and J. C. G. Sampaio Goes. Prevention and Control Program: Cancer of the Cervix in Developing Countries. *Ann Int Symp Gynec Oncol*, June, 1978.
- (22) Strax, P. Benefit of Breast Cancer Screening on Morbidity and Mortality. In H. Bostrom, et al. (eds.) *Health Control in Detection of Cancer*. Almqvist and Wiksell, Stockholm, 1976.
- (23) Strax, P. Results of Mass Screening for Breast Cancer in 50,000 Examinations. *Cancer* 37(1):30-35, 1976.
- (24) Strax, P. Control of Breast Cancer through Mass Screening. *JAMA* 235(15):1600-1602, 1976.
- (25) Easson, E. C. *Teoría y práctica de la educación sanitaria en la lucha contra el cáncer*. Unión Internacional contra el Cáncer, Geneva, 1974.
- (26) Torloni, H., and R. Brumini. *Registro Nacional de Tumores*. Ministério da Saúde (Divisão Nacional de Câncer), Brasília, 1978.