

# **SOCIAL FACTORS AFFECTING PATIENT UTILIZATION OF HIGH-TECHNOLOGY MEDICINE IN NEPAL**

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## **Introduction**

The introduction and institutionalization of modern Western medicine and medical practices into developing countries is a social process that requires significant investments in training, physical facilities and equipment. With the cultural barriers to the acceptance of Western medical philosophy; the establishment of a modern medical system, its struggle for hegemony of coexistence with indigenous systems, and its widespread diffusion across the geographic and social landscape is a long-term process (Subedi and Subedi 1995). Typically modern medicine is first available and accepted by cultural and social elites residing in principal urban areas. The diffusion of modern practices is uneven within the society. One way in which this uneven diffusion can be indexed is by the introduction of state-of-the-art medical technology. Modern Western medical care is typified, in part, by the intensive use of expensive advanced technology. IN the West (and especially in the United States) new advanced technologies are rapidly diffused because of the availability of funds (from various sources) and high level of legitimacy of the medical enterprise

These conditions do not obtain in developing countries The proportion of national GDP devoted to modern medical practices is trivial compared to investments within Western societies. Advanced technology, therefore, is often ill-suited, inappropriate or unaffordable in developing countries At the same time, it is not atypical for developing countries to obtain exemplars of advanced technology and to use this equipment where it is available and for patients with special access (Subedi 1992).

In the present study we report on the introduction of a state-of-the-art mammography machine into the developing country of Nepal. Our objective in this case study is to evaluate the use of this machine in the context of a

Western medical system that is significantly under-developed in terms of its extent and institutionalization. This particular case is appropriate because the various ways in which the machine can be used reflect the differences between a highly institutionalized, resource-rich environment and an environment in which the medical system is poorly established and is resource poor.

Mammography is a technique that can be applied to medical practice in two distinct ways. It can be used for diagnostic purposes for screening of the general female population. In the United States, for example, mammography was first used exclusively for diagnostic purposes, although its potential as a screening device was well-recognized, technical difficulties and the scarcity of machines and trained personnel kept mammography a diagnostic tool for a significant period of time (Gold 1992; Gold, Bassett and Widoff 1990; Feig 1993). Both the operation of the machine and its significance as an early detection device required technical development as a precondition for its widespread use as a screening tool. In addition, of course, its use as an effective screening technique required the proliferation of the equipment itself, a process which consumes significant resources.

A developing society such as Nepal does not have the luxury to expend the significant resources needed to establish a national screening program. The low level of institutionalization of the Western medical system would make it extremely unlikely that the use of a single mammography machine would be compatible with a screening program. Maximum use of the machine would result in the evaluation of no more than about 3000 women per year. Moreover, the disease burden in the society is largely defined as infectious and parasitic diseases and problems related to infant mortality. Consequently, the existing medical system is principally oriented to the provision of basic curative therapy. Additionally, there is a strong relationship between the "women's movement" in developed countries and attention to and expenditures for women's health problems. Such a movement does not exist in Nepal.

These conditions clearly suggest that the mammography machine will be used diagnostically rather than as a screening device. However, this proposition must be evaluated empirically. There are counter arguments. For example, access to Western medical services is highly skewed toward the economic and political elites. Therefore, it is possible that the single machine could be used as a screening device if its main use focusses on such elites. Members of these elites frequently leave the country to get advanced medical care, including mammograms. It is conceivable that the presence of a mammography machine within the country would induce these elites to use it if its use could be limited to their group. It is also the case that there are no estimates of breast cancer prevalence for Nepal or information on risk factors

for the specific population. Therefore, it might also make sense to use the machine for screening to build a database. While the collection of epidemiological data also diverts resources from the central enterprises of the medical system, it could be accomplished with little additional cost. In sum, the manner in which this machine is used might be affected by a variety of factors.

### *The Case Study*

In May 1994 a state-of-the-art mammography machine donated by its manufacturer to the country of Nepal was delivered and installed in Kathmandu. A team of experts, consisting of a radiologist, two mammography trainers and a technician, accompanied the arrival of the machine. The machine was placed in a separate set of rooms in the X-ray department of the Teaching Hospital operated by Tribhuvan University. Physicians in Nepal were trained in the use of the machine, interpretation of mammograms and treatment techniques. Several X-ray technicians were also trained to do the examination and a record-keeping system was established. The American team stayed in Nepal for approximately three weeks and conducted approximately 75 exams before departing. There was widespread publicity about the arrival of the equipment and the presence of the American team. Upon their departure, the American team was satisfied that the machine could be operated effectively.

Data regarding the use of the machine was collected using a specially developed "Mammography Clinic Patient Record" form. This form contains information about the social and medical backgrounds of each patient undergoing a mammography procedure and the results of each exam. The form was designed to help Nepali physicians in the interpretation of the exam and to supply data for other analytic purposes. Copies of the patient record forms were collected from the clinic each week and sent to us for analysis. A total of 300 patient records were obtained between the introduction of the machine (approx. June 1, 1994) and the end of 1994.

### *Diagnostic versus Screening Mammography*

According to Feig (1993:193) mammographic *screening* is defined as the periodic examination of women, whether or not they are at high low risk based on family or personal history or other risk factors who do not present with any symptoms to suggest the possibility of malignancy. By contrast "...*diagnostic* mammography is performed in response to clinical signs or symptoms....".

The patient record form includes a record of the presence of current complaints related to the possible presence of malignancy: breast lumps,

pain, discharge from the nipple, skin dimples or skin thickening. Following the definition above, women who were reported as having one or more of these complaints were classified as "diagnostic" cases while those women who had no current complain were classified as "screen" cases.

### *Risk Factors*

In the absence of specific complaints, considered signs or symptoms of breast malignancies, use of mammography is defined as screening. As the definition of screening suggests, however, both high and low risk women can be screened, but with a clear preference to screen women with higher risk. This preference is clear in contemporary American debates over the need for women under 50 to have mammograms, for example. The determination of risk factors is derived from studies done in the United States and Canada. While it is possible that these factors have different importance in Nepal, it is likely that they are nevertheless risk factors. Those measured include age of first menstruation, number of pregnancies, female family history (and patient history) of breast problems or cancer, and menopause or hysterectomy age. Risk characteristics of diagnostic and screening cases will be compared.

### *Social Characteristics*

When risk factors are controlled, diagnostic use of the mammography machine would imply that there should be no significant differences in the demographic characteristics of patients. That is, if symptoms prompt the use of the mammography machine as a diagnostic test, then controlling for risk factors, there should be no differences from population distributions in the status characteristics such as marital status, occupation (husband's), education, or referral source among women using the test for diagnostic purpose, because symptoms alone prompt the referral. ON the other hand, screening use of the machine should be highly biased toward "early adopters" such as those with high education, occupational attainment and high caste. Access is somewhat equalized by a commitment to offer the service free of charge for low income women.

### *Analytic Strategy*

Cases will be divided a priori into diagnostic or screening cases based on the reported presence or absence of symptoms. The proportion of screening and diagnostic cases on a month-by-month basis will be examined to determine if experience using the machine affects the selection of patients. Risk factor status between diagnostic and screening cases to establish the role that risk factors play in the way the machine is used will be compared. And distributions of social characteristics will be evaluated to see what role these

factors may play. The results of these analyses will then be used to assess the argument presented at the outset about the use of this high-technology medical device in Nepal.

## Results

The use of the mammography machine was compared over the course of two periods of time (Table 1). The "training" period is defined by the presence of the American team and includes all uses of the machine whether managed by the American team or Nepalis. The table clearly shows that following the initial training period, use of the machine shifted to diagnostic application. The shift would appear even more dramatic on a month-to-month basis. Of the thirty-two screening cases examined after the training period, only fourteen were done after July 1. In essence, the machine is now used exclusively for diagnostic purposes. This represents a conscious decision by Nepali physicians. They have developed written guidelines for mammography which specify: "All patients must be referred by a doctor". A fee has been established for each use of the machine, and at present the mammography lab is only open three day per week for a two-hour period. This pattern of use is consistent with our argument that the use of this high-technology equipment will be for diagnostic applications.

**Table 1: Use of Mammography Machine for Diagnostic and Screening Purposes**

Type of Exam	Time Period		
	Training	Operational	Total
Screening	33	32	65
Diagnostic	46	189	235
Total	79	221	330

Note: Prior to June 15, 1994 is considered to be a *training* period in which the American team worked with Nepali physicians to make the machine operational and assure that the machine would be operated properly. After June 15, the machine was regarded as *operational* and was solely used by Nepali physicians.

Demographic, risk and referral data for screen and diagnostic cases were compared (table 2). Although most of the screen cases were examined prior to the departure of the American team, the demographic comparisons show that screen cases tend to come from among more educated households. While age

was listed as a risk factor rather than a demographic condition, screen cases are much older than diagnostic cases.

**Table 2: Characteristics of Screen and Diagnostic Patients**

Characteristics	Type of Exam		
	Screen (n = 65)	Diagnostic (n = 235)	P
<b>Demographics</b>			
Patient Education	2.23	1.72	.008
Husband Education	3.27	2.65	.000
Caste	3.27	3.22	n.s
Marital Status	1.05	1.23	.001
Husband's Employment	.68	.92	.000
<b>Risk Factors</b>			
Age	47.8	37.5	.000
Age 1st Menstruation	13.95	14.53	.031
Number of Pregnancies	3.00	2.49	.034
Still Menstruating	.49	.88	.000
Previous Breast Surgery	.25	.23	n.s.
<b>Breast Problems in Family</b>			
Patient	.21	.24	n.s.
Mother	.02	.05	n.s.
Sister(s)	.02	.06	n.s.
Aunt(s)	.09	.04	n.s.
Grandmother(s)	.02	.00	n.s.
Breast Cancer in Family	.08	.06	n.s.
<b>Referral Sources</b>			
Relative/Friend	.45	.10	.000
Physician	.38	.82	.000
Media	.45	.18	.000
Someone who had been to clinic			

Note: Patient Education and Husband are coded 0 = None, 1 = 8 years or less, 2 = 9 to 10 years, 3 = 11 to 14 years, 4 = 15 or more years. Caste is coded 1 = Non-Hindu, 2 = Brahmin, 3 = Chetri, 4 = Vaishya, 5 = Sudra. Marital Status is coded 1 = Married, 2 = Widow, 3 = Divorced/Separated, 4 = Never Married. Husband's Employment is coded 0 = Unemployed, 1 = Employed.

Still Menstruating, Previous Breast Surgery, Breast Problems in Family, Breast Cancer in Family, Referral Sources are coded 0 = No, 1 = Yes

n.s. = difference not significant

p = t-test probability of equal means between groups

Thus age is clearly the most important risk factor distinguishing screening from diagnostic cases. Since diagnostic cases are defined by physical complaint, it is sensible to think that the complaint, rather than age, would determine use of the mammography equipment. The higher age of screening cases also falls in line with recommendation that such screening should be more frequent for older women. Age also account for the differences in rate of menstruation that are observed. The only other risk factor that appears to differ is the relationship between family history of breast cancer and case type. Screening was more likely to include women with a family history of breast cancer.

Examination of referral sources confirms the organization of the mammography clinic as a diagnostic resource that is accessible only by the physician referral. Eighty-two percent of diagnostic cases were based on physician referral (90% of those after the departure of the American team), while screen cases were drawn from various informal sources (friends, media and previous users).

## Conclusions

This straightforward analysis of the first 300 mammographic examinations conducted in Nepal provides cautious support for the following conclusions. The introduction of this high-technology machine into a medical system oriented principally toward basic curative medicine anticipated that its use would be made consistent with this orientation. This appears to be confirmed. After the initial training period, the machine has been used almost entirely for diagnostic purposes. Moreover, it appears to be used in appropriate way, that is, diagnostic cases are not selected for reasons other than their symptomology. For instance, social status does not appear to explain access to the machine for diagnostic purpose. Further, the profile of screening cases suggests that they too are being conducted appropriately (in terms of general

recommendations—greater frequency over age 50, family history of breast cancer). The higher educational levels among screen cases is also consistent with findings in the United States which show educated women as more likely to seek screening mammograms.

It should be noted that the women who have undergone mammographic examinations are largely from the economic and educational elite. The demographic differences between screen and diagnostic cases are slight and do not indicate that the mammogram machine is accessible to poor, uneducated women. Thus, use of the machine, while technically appropriate, also reflects larger status divisions within the society. This is a technology that is available to a small socially privileged group.

Finally, regarding a more global issue related to the diffusion of medical technology it was argued that the introduction of this state-of-the-art mammography machine which can be employed in two distinct formats is particularly useful for evaluating the relationship between modern Western medicine and indigenous health care systems in developing societies. In this regard the results imply two conclusions. First, modern medical equipment (and techniques) are likely to be modified by modern practitioners in developing countries to fit the general orientation to practice (i.e., basic curative). This implies that expensive high technology equipment is probably not the best method for modernizing health care systems. Such equipment reflects the status of the modern health care system in the West in which the disease burden is different, basic services are well-diffused and resources devoted to health care are very high. The machines developed in this context are highly specialized in purpose and function and, therefore, not entirely appropriate for the most significant needs of modernizing systems. Second, while it is clear that the mammography machine's use has been turned to its most appropriate application in this context, it should also be noted that it is significantly underutilized. Mammography is now only available three days per week and for limited hours, further reducing the value of this machine. The infrastructure of modern medicine in Nepal is insufficiently developed to afford maximum use of the machine. Given the basic curative orientation of the practice of modern medicine in Nepal, the capabilities of the machine that exceed its basic curative role cannot be exploited.

While none of these conclusions must be taken as tentative due to the limited data available, they are provocative enough to suggest the importance of continuing to examine their implications.

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