

An observation that lung cancer seldom occurs among southwestern American Indians, while cirrhosis of the liver is prevalent in this group, led to a study of cigarette and alcohol use. The findings confirmed the impression that cigarette smoking is infrequent and seldom extensive, but that an increased proportion of the men drink alcohol, while heavy drinking is much more frequent among Indians of both sexes than in the white population.

CIGARETTE AND ALCOHOL USAGE BY SOUTHWESTERN AMERICAN INDIANS

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AMONG the adverse environmental health factors recently receiving increased emphasis are cigarette smoking and alcohol usage. An investigation of smoking and drinking among southwestern Indians has recently been completed. The results of this study and its possible implications concerning some disease patterns in this ethnic group are included in this presentation.

Method

The Indian patients over 15 years of age who were admitted to the medical service of the Phoenix Public Health Service Indian Hospital from 1961 through 1965 were interviewed concerning cigarette and alcohol usage. For uniformity, all of the information which is utilized was obtained by one interviewer. Multiple hospital admissions with repeated interviews occurred for several patients, but each individual is included in the study only once.

The Phoenix Public Health Service

Indian Hospital is a referral center for an Indian beneficiary population of over 48,000, located in Arizona, California, Nevada, and Utah. The tribal distribution of hospital admissions was: Pima, 35.1 per cent; Apache, 21.3 per cent; Navajo, 10.2 per cent; Papago, 8.0 per cent; Hopi, 6.3 per cent; other southwestern tribes (Maricopa Yavapai, Cocopah, Yuma, Hualapai, Havasupai, Chemehuevi, Mohave, Shoshone, Ute, Paiute and Washoe), 15.9 per cent; and nonsouthwestern Indians, 3.2 per cent.

Although criteria for evaluation of cigarette smoking are relatively straightforward and noncontroversial, it is much more difficult to categorize the extent to which alcohol is used. Lifetime histories were considered. Cigarette smoking was classified as follows: none; light (less than one-half package a day); moderate (between one-half and one package daily); and heavy (greater than one package daily). For alcohol usage, the "quantity-frequency index" of Mulford and Miller¹ was used. The four cate-

Table 1—Comparison of cigarette usage among southwestern Indians, nonsouthwestern Indians and Caucasians, by race and sex

| Group | Male | | | Female | | | Both | | |
|------------------------|--------------|---------|------|--------------|---------|------|--------------|---------|------|
| | Total No. | Smokers | | Total No. | Smokers | | Total No. | Smokers | |
| | | No. | % | | No. | % | | No. | % |
| Regular use | | | | | | | | | |
| General | | | | | | | | | |
| population* | 18,697 | 12,447 | 66.6 | 24,371 | 8,093 | 33.2 | 43,068 | 20,540 | 47.7 |
| NonSW Indians | 18 | 10 | 55.6 | 24 | 11 | 45.8 | 42 | 21 | 50.0 |
| SW Indians | 361 | 114 | 31.6 | 470 | 60 | 12.8 | 831 | 174 | 20.9 |
| Heavy use | | | | | | | | | |
| (>1 pkg/day) | | | | | | | | | |
| General | | | | | | | | | |
| population* | 18,697 | 6,009 | 32.1 | 24,371 | 2,919 | 12.0 | 43,068 | 8,928 | 20.7 |
| NonSW Indians | 18 | 6 | 33.3 | 24 | 5 | 20.8 | 42 | 11 | 26.2 |
| SW Indians | 361 | 16 | 4.4 | 470 | 5 | 1.3 | 831 | 21 | 2.5 |

* All data in this table are confined to those over 30 years of age because the general population was in this category in the study quoted, which is that of Hammond, E. C., and Garfinkel, L. Smoking Habits of Men and Women. J. Nat. Cancer Inst. 27:419-442 (Aug.), 1961.

gories include: none; light (drinking any quantity not more than once a month); moderate (consuming any amount from two to four times a month); and heavy (imbibing greater quantity than 1.6 ounces of absolute alcohol more than once a week). It is to be emphasized that "alcoholism" with its various connotations, including the adverse effects from alcohol usage, is not entirely synonymous with "heavy drinking."

The tribes in which more than 50 Indians were studied are considered separately. Those with fewer than 50 evaluated are included in the category of "other southwestern tribes." In most of the comparative evaluations, data are age- and sex-adjusted.

Results

Although information was obtained concerning various degrees of cigarette and alcohol usage, this presentation will concentrate on the abstainers and heavy users, since major health hazards are usually considered associated with the latter. The usage of cigarettes by southwestern Indians over 30 years of age

is compared with that of nonsouthwestern Indians and the general population in Table 1. The general population data of Hammond and Garfinkel² show no significant difference from nonsouthwestern Indians in regard to either regular or heavy use of cigarettes, but a much greater proportion of both male and female southwestern Indians are neither smokers nor heavy users. This information is graphically shown in Figure 1. In all three of the study groups, men smoke much more often than women.

A tribal age-adjusted comparison of lifetime cigarette usage among Indians over 15 years of age is shown by sex in Figure 2. The range is from 44.0 per cent to 67.8 per cent for males and from 10.8 per cent to 67.3 per cent for females. Cigarette usage for both sexes is most prevalent among the nonsouthwestern Indians and least frequent in the Havasupai-Hualapai, although the other tribes do not show a similar parallelism in the degree of usage by each sex.

Heavy cigarette smoking (greater than one package daily) is reported for a similar segment of the general population² and nonsouthwestern Indians,

while the range of zero per cent to 6.4 per cent for the southwestern tribes, as shown in Figure 3, is significantly less (age- and sex-adjusted data). Heavy smoking was observed in a smaller proportion of the Hopi, Pima, Havasupai-Hualapai, Colorado River, and Apache tribes, while it occurred for a higher percentage of the Navajo, Papago, and other southwestern tribes.

A comparison of the usage of alcohol by race and sex is shown in Table 2 and Figure 4. The white population data is that of Mulford and Miller.³ Both southwestern and nonsouthwestern Indian males have a greater prevalence of drinking than that reported for white men. No significant difference of the percentage imbibing was noted for females of these three groups, although it had been a clinical impression that there were fewer women abstainers among Indians than

whites. More males than females are drinkers among both the Indians and the Caucasians.

The utilization of hospitalized subjects in this study may introduce a selection factor not present in field investigations. It is doubtful that this influence is significant for smoking, but it might concentrate the extent of alcohol usage. However, Whittaker's evaluation⁹ of the nonsouthwestern Sioux tribe by the field interview method yielded even higher results for drinking than those reported in the present study (for males: Sioux,⁹ 82 per cent; southwestern Indians, 78 per cent; nonsouthwestern Indians, 72 per cent; and Caucasians,³ 69 per cent; and for females: Sioux,⁹ 55 per cent; southwestern Indians, 48 per cent; nonsouthwestern Indians, 51 per cent; and Caucasians,³ 51 per cent). The significance of observations for nonsouthwestern

Figure 1—Comparison of regular usage of cigarettes, over 30 years of age, by race and sex

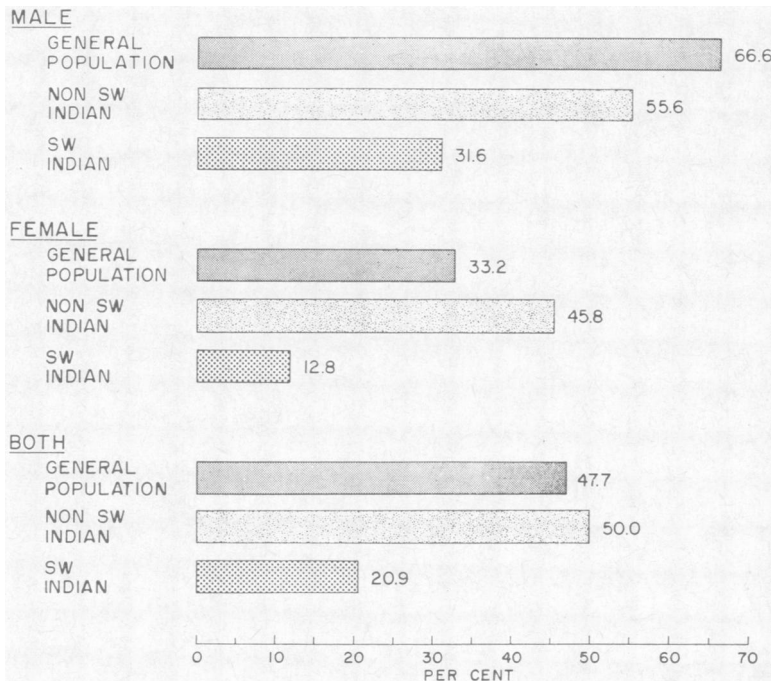
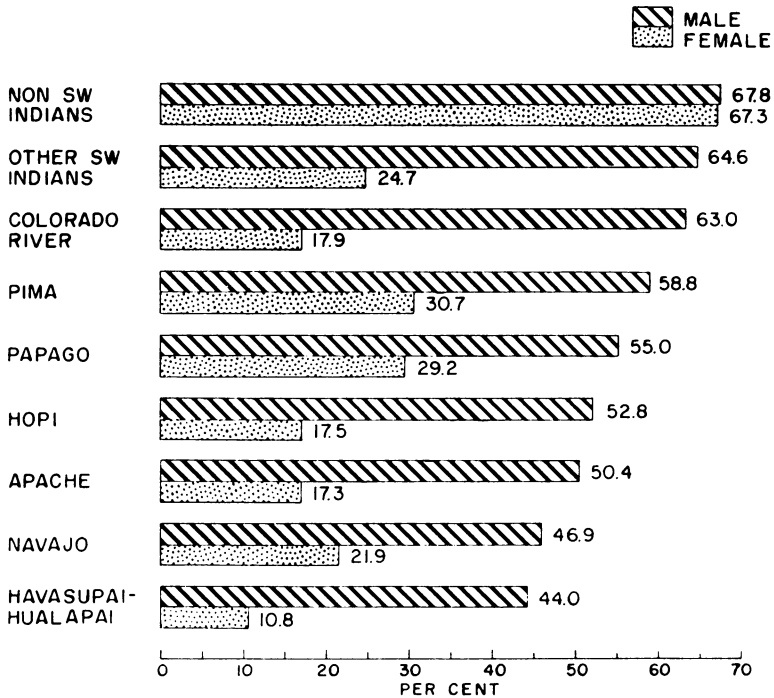


Figure 2—Comparison of usage of cigarettes among Indians over 15 years of age, by tribe and sex



tribes in the present investigation is somewhat limited because of the small number from that group included in the study. For the various tribal groups the data are comparable since all Indian information was obtained in a similar manner.

Comparison of Indian alcohol usage by tribe and sex is shown in Figure 5. The prevalence of male drinking approximately parallels that for females, with two exceptions: the Apache women have a disproportionately greater percentage, and the Hopi women a much smaller frequency, than expected on the basis of the male experience. Both of these findings are compatible with clinical observations.

Heavy usage of alcohol is compared by race and sex in Table 2 and Figure 6. Although heavy drinking is noted about equally in the southwestern and

nonsouthwestern Indians, it is recorded much more often for both Indian groups (37.2 per cent and 35.5 per cent) than for Caucasians (8.9 per cent). Less than twice (1.8) as many Indian males as females drink heavily, while over three times (3.6) as many white men as women do so. The disparity in frequency of heavy drinking among Caucasians and the two Indian groups is much greater for females than males. Possibly some of the differences noted in the extent of alcohol usage by the two races may relate to variations in interpretations by different investigators, since a significant subjective factor exists. However, all of the comparative observations are consistent with clinical impressions.

In Figure 7 a comparison of heavy usage of alcohol among Indians is shown by tribe and sex. Especially noteworthy

is the significantly lower frequency of heavy drinking for the Hopi than for the other tribes. Their rate approximates that of Caucasians. These findings coincide with clinical observations.

Racial and tribal comparisons of the usage of both alcohol and cigarettes are shown in Figure 8. In general, there is an inverse relationship between the frequency of drinking and cigarette smoking among southwestern tribes. Figure 9 presents an evaluation of the use of cigarettes and alcohol, while Figure 10 compares the heavy usage of these products, both by race and sex. Less frequent and less extensive cigarette smoking is observed among southwestern Indians of both sexes than for either the nonsouthwestern Indians or the general popula-

tion. In contrast, heavy use of alcohol occurs among a significantly greater proportion of the two Indian groups of both sexes than for Caucasians. The percentage of male abstainers is somewhat less among southwestern tribes than for nonsouthwestern Indians or Caucasians, while there is no significant difference for females of these three groups. As shown in Figure 10, heavy cigarette smoking occurs more often than heavy drinking in the general population, while the opposite occurs among southwestern Indians. The nonsouthwestern tribes show little contrast in the heavy usage of these two products, approximating the southwestern Indians for alcohol consumption and the general population for cigarette smoking.

Figure 3—Comparison of heavy cigarette smoking (>1 pkg/day) among southwestern Indians (by tribe), nonsouthwestern Indians and the general population (over age 30 years)

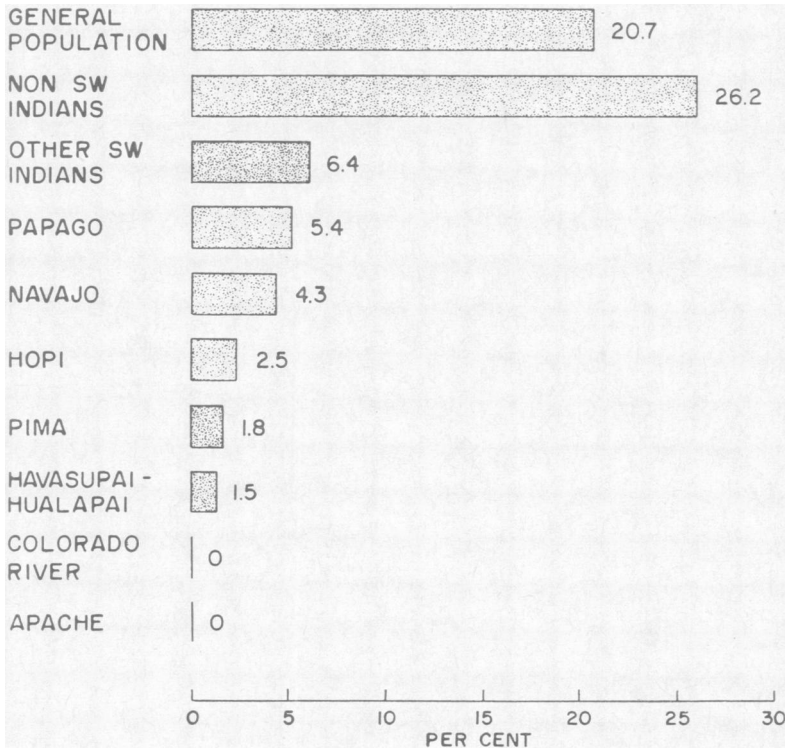


Table 2—Comparison of alcohol usage among southwestern Indians, nonsouthwestern Indians and Caucasians, by race and sex

| Group | Total No. | Drinkers | | Heavy drinkers | | Abstainers | |
|---------------|-----------|----------|------|----------------|------|------------|------|
| | | No. | % | No. | % | No. | % |
| SW Indians | | | | | | | |
| Male | 566 | 439 | 77.6 | 297 | 52.5 | 127 | 22.4 |
| Female | 667 | 321 | 48.1 | 163 | 24.4 | 346 | 51.9 |
| Both | 1,233 | 760 | 61.6 | 460 | 37.2 | 473 | 38.4 |
| NonSW Indians | | | | | | | |
| Male | 25 | 18 | 72.0 | 11 | 44.0 | 7 | 28.0 |
| Female | 37 | 19 | 51.4 | 11 | 29.8 | 18 | 48.6 |
| Both | 62 | 37 | 59.7 | 22 | 35.5 | 25 | 40.3 |
| White* | | | | | | | |
| Male | 585 | 401 | 68.6 | 82 | 14.0 | 184 | 31.4 |
| Female | 593 | 301 | 50.8 | 23 | 3.9 | 292 | 49.2 |
| Both | 1,178 | 702 | 59.6 | 105 | 8.9 | 476 | 40.4 |

* From the study of Mulford, H. A., and Miller, D. E. *Drinking in Iowa. II. The Extent of Drinking and Selected Sociocultural Categories.* *Quart. J. Stud. Alcohol* 21:26-39 (Mar.), 1960.

Discussion

Despite the fact that tobacco was cultivated and used by American Indians long before its introduction into other cultures, at present it is little used by southwestern tribes. In addition, conditions considered to some extent to be associated with heavy cigarette usage—lung cancer, pulmonary emphysema, duodenal ulcer, and coronary artery disease—are uncommon in Indians of the Southwest.⁴⁻⁷ No previous investigations of smoking by southwestern Indians are known.⁸

By contrast, alcohol was apparently unknown to American Indians prior to its introduction by Europeans. However, observations now suggest that the usage of alcohol by Indians^{6,7,9-11} is extensive, but no prior data for southwestern tribes are available.⁸ There is a clinical impression that Laennec's cirrhosis is prevalent in southwestern Indians, occurs espe-

cially often in women, and is noted at a younger age than among other population groups.^{6,7}

The results of this study support the previous opinion that southwestern Indians seldom smoke cigarettes, and few do so extensively. In general, a greater proportion of the desert tribes (Colorado River, Pima, and Papago) than the mountain or canyon tribes (Hopi, Apache, Navajo, and Havasupai-Hualapai) use cigarettes. However, the extent of smoking is less clearly delineated in these two geographic tribal groups.

Hammond and Garfinkel² noted that cigarette smoking in the general population was less prevalent at the two extremes of education—college graduation or less than high school. Most southwestern Indians are in the latter category.¹² It has also been observed that the proportion of heavy cigarette smokers and the death rate from lung cancer are lower for rural than urban areas.² The

isolated reservations where most southwestern Indians reside are rural, and lung cancer is rare among these tribes.^{4,7}

There is less frequent and less extensive cigarette smoking in the older age groups of the general population,² as well as among the Indians of the present study. Perhaps this decrease with age relates to changing patterns of usage for the younger generations. In this regard, the present study reveals a small, but definite, increase in the proportion of the younger southwestern Indians of both sexes who smoke cigarettes or are heavy smokers, in comparison with the middle-aged or older ones.

Although the findings of this investigation support the impression that a greater proportion of the southwestern Indians who drink alcohol imbibe more extensively than the general population, evidence that these tribes also have fewer abstainers is less convincing. In particu-

lar, the clinical conviction that the use of alcohol by southwestern Indian females is more frequent than among the women of the general population is unsupported by the results. The apparently increased prevalence of Laennec's cirrhosis,^{6,7} alcoholic neuropathy, and delirium tremens in tribes of the Southwest relates to heavy drinking but does not necessarily indicate alcohol usage by a greater proportion of the population.

Mulford and Miller¹ noted that the frequency of heavy alcohol usage among the white men of Iowa was directly related to the extent of education, while an inverse relationship was found for women. In addition, they reported heavy drinking more often in urban than in rural areas. Age differences in the extent of drinking were not pronounced, except for a marked decline in the proportion of heavy drinkers in the older age group. A decrease in alcohol usage

Figure 4—Comparison of usage of alcohol, by race and sex

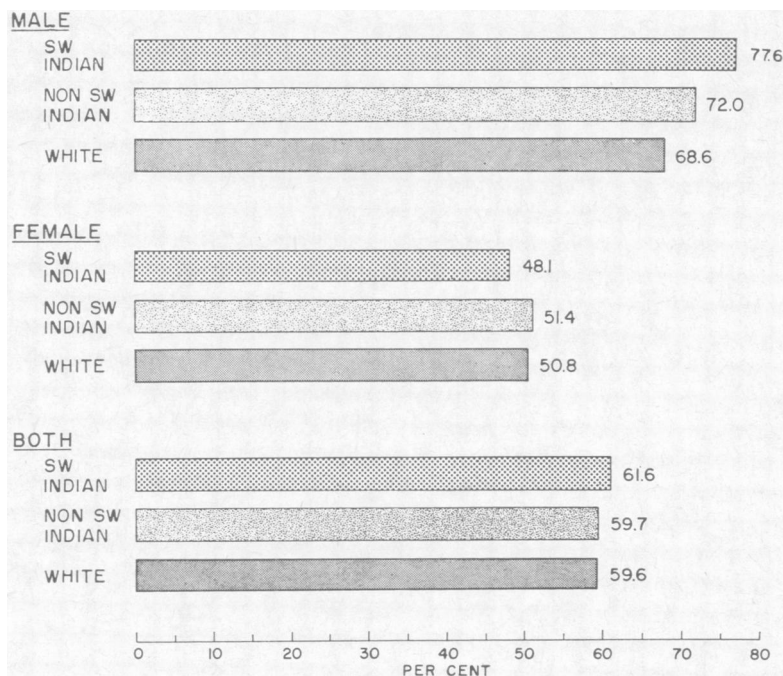


Figure 5—Comparison of alcohol usage among Indians over 15 years of age, by tribe and sex

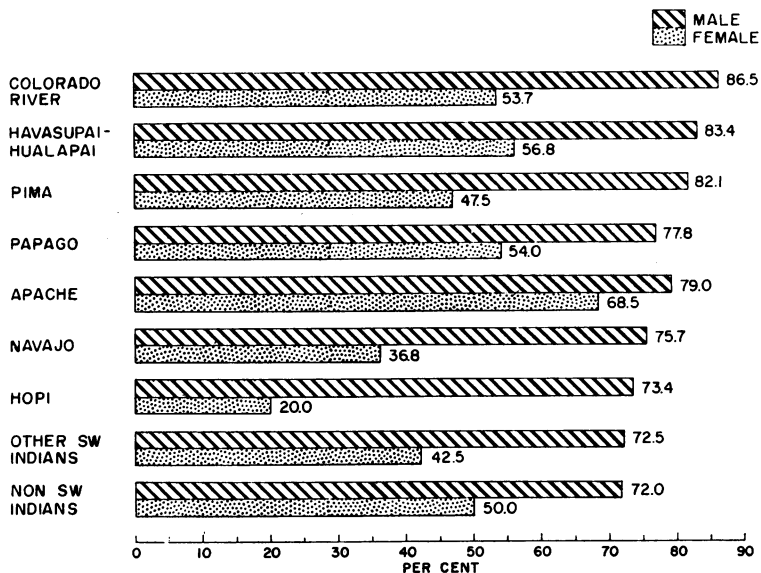
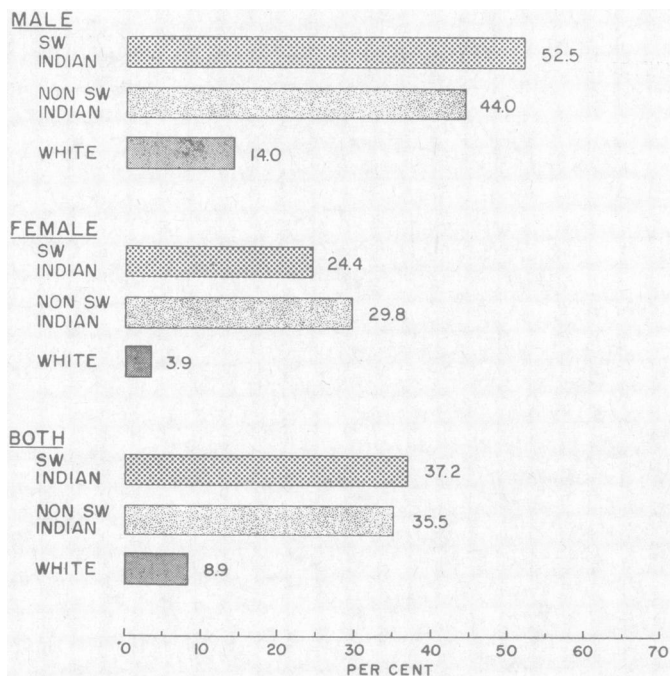


Figure 6—Comparison of heavy usage of alcohol, by race and sex



in the older age group also occurs for the Indians in the present study, but the other findings for Iowans offer little evidence to explain the extent of heavy drinking among the tribes of the Southwest.

Numerous studies by anthropologists, sociologists, and psychologists stress that excessive drinking is not racially determined and that Indians are not inherently more susceptible to intoxication.^{9-11,13,14} Possible explanations of the etiologic factors in heavy drinking include sociocultural deprivation,¹⁰ various cultural factors,¹¹ and acculturation stress.¹³

Several southwestern Indian tribal groups have recognized that heavy alcohol usage is a significant problem, and they are undertaking cooperative programs to combat it.^{14,15} Recently, Szuter

and Saiki¹⁶ reported considerable benefit in the treatment of Navajo Indians with problem drinking by the use of disulfiram.

Summary

An evaluation of cigarette and alcohol usage among southwestern Indians was undertaken because of the observation that lung cancer seldom occurs, while Laennec's cirrhosis is prevalent in this ethnic group. A study of 1,233 southwestern Indians confirmed the impression that cigarette smoking is infrequent and seldom extensive. The desert tribes use cigarettes more often than the mountain or canyon tribes. Indian women smoke much less frequently than the men.

The proportion of men who drink al-

Figure 7—Comparison of heavy usage of alcohol among Indians, by tribe and sex

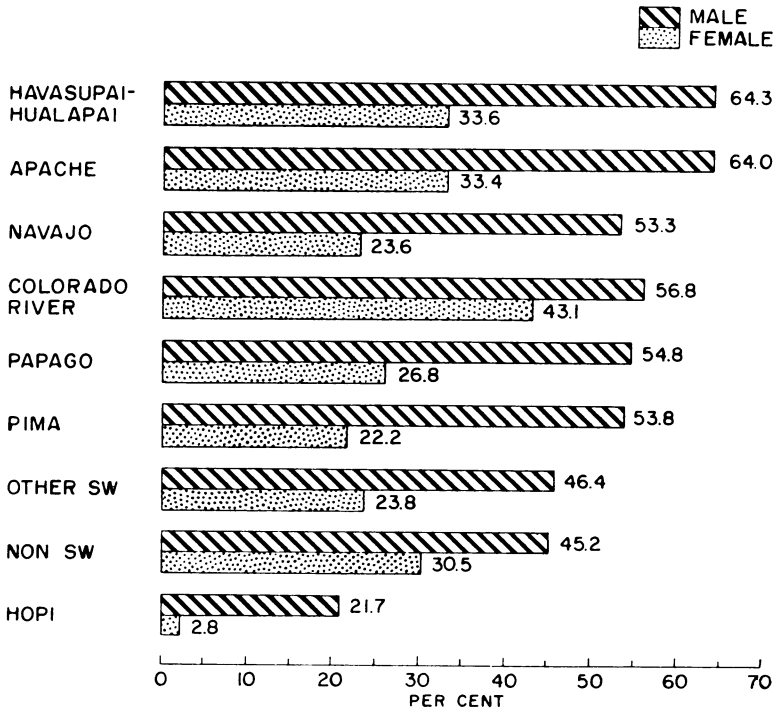


Figure 8—Tribal and racial comparison of usage of alcohol and cigarettes

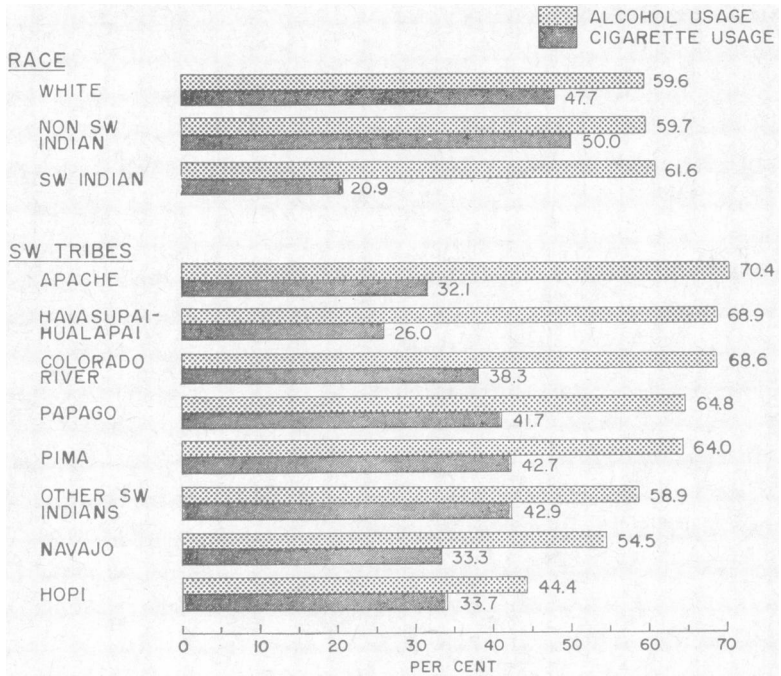


Figure 9—Comparison of usage of alcohol and cigarettes, by race and sex

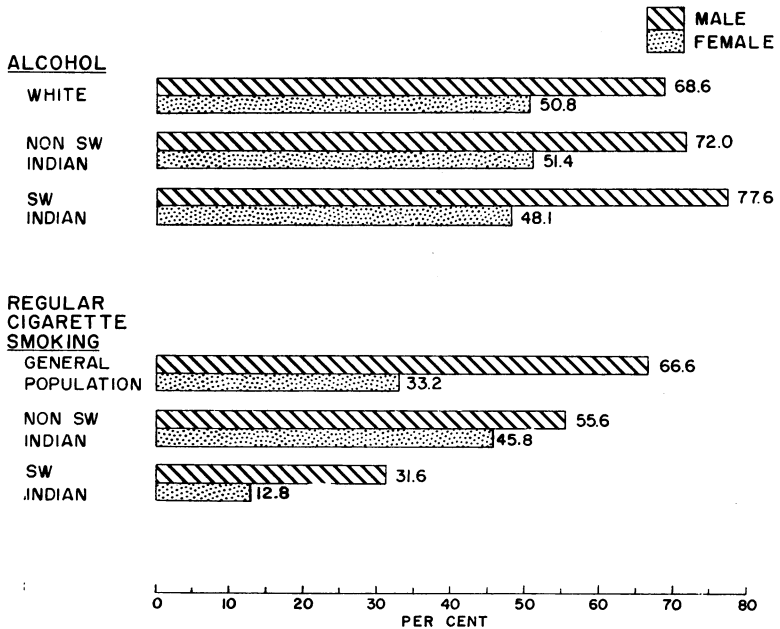
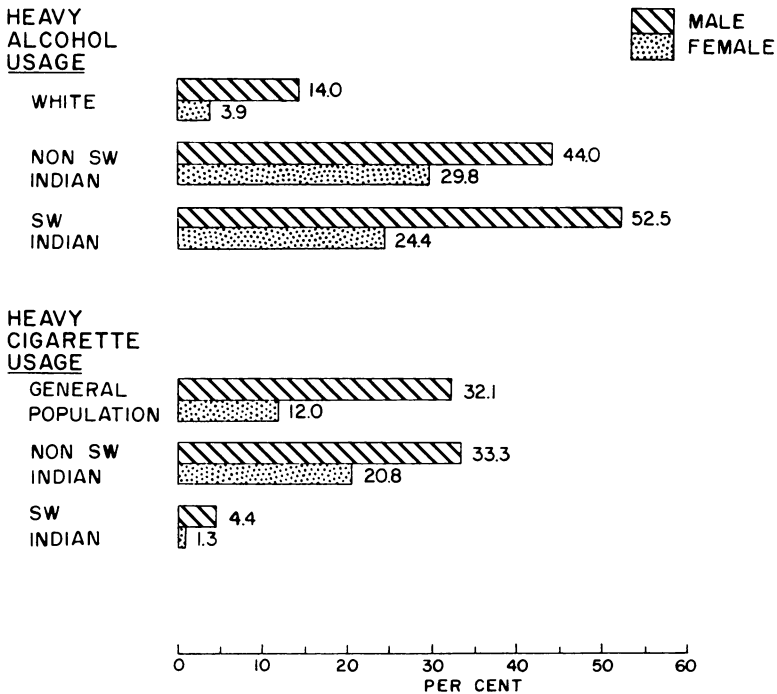


Figure 10—Comparison of heavy usage of alcohol and cigarettes, by race and sex



cohol is apparently greater for southwestern Indians than for nonsouthwestern tribes or Caucasians; among the women, no significant differences exist. Heavy alcohol usage occurs much more frequently in both sexes of each Indian group than has been reported for the white race. The male to female ratio of the heavy drinkers among southwestern Indians (1.8:1) is one-half that noted for Caucasians (3.6:1).

Tribal comparisons for southwestern Indians indicate that the Hopi of both sexes use alcohol least often and least extensively, while the proportion of women who drink is greatest for the Apaches. In general, the tribes display an inverse relationship between the prevalence of drinking and smoking. Nonsouthwestern Indians apparently approximate the general population in smoking habits and the southwestern Indians in alcohol usage.

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Second Western Hemisphere Nutrition Congress

The second Western Hemisphere Nutrition Congress will be held in San Juan, Puerto Rico, August 26-29. The congress has been organized by the American Institute of Nutrition and the American Medical Association's Council on Foods and Nutrition, in cooperation with the Nutrition Society of Canada and the Latin American Nutrition Society. A multidisciplinary format will emphasize research and program developments in Latin America.

Scientists are invited to submit 300-word abstracts for research forum presentations. Forum sessions will deal with atherosclerosis, protein-calorie malnutrition and nutrition anemias, trace mineral and vitamin metabolism, and food science. Abstracts should be sent to Dr. William N. Pearson, Division of Nutrition, School of Medicine, Vanderbilt University, Nashville, Tenn. 37203 and must be received before March 1 to be included in the program.

For program, registration, and hotel information, communicate with the Council on Foods and Nutrition, American Medical Association, 535 North Dearborn St., Chicago, Ill. 60610