

CONTEMPORARY HOPI FOOD INTAKE PATTERNS

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The Hopi are thought to have retained more of their traditional cultural patterns than most Native American groups in the United States today. However, less than 25 percent of dietary recalls from 420 children and women homemakers included one traditional food item in the daily regime, and today there is much less variety in the traditional foods used than when the diet was composed entirely of indigenous foods. The economic, geographical and cultural implications of the declining use of Hopi traditional foods are discussed.

INTRODUCTION

The Hopi are a Native American group of the Kayenta-Anasazi tradition who settled in the semi-desert environment of Northeastern Arizona as early as 100 A.D. (Hopi Tribal Council, 1976). They inhabit the most westerly of the pueblo communities of Arizona and New Mexico, and have succeeded in retaining at least some of their prehistoric land base throughout the period of Spanish and subsequent Anglo-American acquisition of Indian lands. The Hopi are thought to be relatively persistent in retaining their traditional customs and dietary practices (Dozier, 1970).

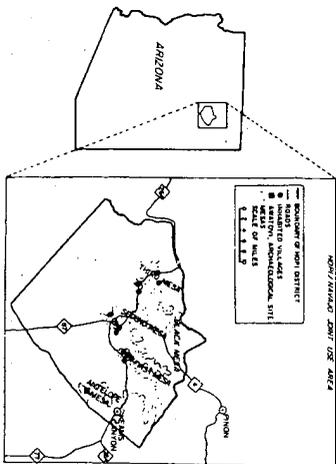


FIGURE 1 The Hopi Area in Arizona, 1975.

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The oldest of the currently inhabited Hopi villages on the southwesterly-projecting spurs of Black Mesa have been dated to 1150-1417 A.D., and these are considered the oldest continuously inhabited villages in the United States (Figure 1). As an agricultural people, the Hopi traditionally harvested much of their food supply from nearby fields, although trips were often made to formerly occupied regions of the Colorado plateau and canyons for hunting game and gathering plants and salt as well as ceremonial objects (Forde, 1931; Hopi Tribal Council, 1976).

The agricultural crops and techniques and consequent dietary patterns of the Hopi evolved to be compatible with the austere desert environment. Fields were located on an alluvial soil from Mesa Verde sandstone and Mancos shale on the Colorado plateau approximately 6000 feet above sea level. Here the Hopi farmer learned to grow family food crops with a scarce 26 centimeters of average annual rainfall augmented by runoff from winter snow. A significant hydrologic feature for the Hopi has been southward drainage of underground water along a plane of impermeable shale from the relatively well-watered top of Black Mesa. Several springs and seeps along the southern edges of the spurs of the mesa provide water for the present villages and permit the irrigation of small gardens. At this altitude the temperature usually varies from 37° to -23°C, and the average frost-free growing season lasts just 120 days. Bradford (1973) and Forde (1937) give excellent accounts of the geography and unusual agricultural practices of the Hopi.

The effective food producing land of these people has declined radically from the precontact

period when wild plants, animals and salt were gathered from areas as far away as the San Francisco Peaks (near present-day Flagstaff) and the Grand Canyon. The Hopi land base was many times the size of the present reservation that the government allocated in 1882, and today there are still unresolved boundary conflicts with the surrounding Navajo (Tilley, 1944; Anon., 1976b). While the introduction of livestock by the Spanish brought new protein resources, it also began a grazing economy for many Hopi as well as for the Navajo. However, because of the reduction of the fragile desert vegetation cover by grazing, problems of erosion have accelerated during the late 19th and 20th centuries. *Aroyos* cutting into the major washes of the Hopi clan farming areas now take the spring snowmelt out of reach of the traditional flood-water farmer. This exacerbates moisture conditions for the native and cultivated vegetation, and has been one factor that has contributed to a lowered water table (Thorntwaite, 1942).

While adequately-producing farmland has become less accessible, the Hopi population has been increasing. The average annual growth rate varied throughout this century, being as high as five percent in the late 1930's, probably due to decreasing infant mortality. Since then, however, the rate has declined to about two percent, and it has been speculated that this is a result of moving into a wage economy where small families are adaptive, and possibly because there has been a significant migration of young people away from the reservation area. Nevertheless, the local Hopi population has grown from the first reasonable written estimation of 2450 in 1846 to the current level of approximately 7500 (Bradfield, 1973; Kunitz, 1974; Hopi Tribal Council, 1976).

When all Hopi foods were supplied entirely by their native environment (except for the small amounts obtained by trading with neighboring tribes), Hack (1942) and Bradfield (1971) independently estimated the required farmland per capita to be two acres in corn and $\frac{1}{2}$ acre in other vegetables. With the average yield at 10-12 bushels/acre, this is in agreement with Stephen's earlier estimates of about 12 bushels of corn consumed per person per year (approximately 692 pounds of cornmeal) and an equal amount stored for lean years (Stephen, 1936). In 1893 it was estimated that there were 3600 acres in corn, 2000 acres in cultivated vegetables, primarily beans and squash, and 1000 acres in peach trees for the total population of 2000 Hopi (Donaldson, 1893).

For various social and geographical reasons, much of the traditional farmland has fallen out of use. As an example, the Oraibi (a Third Mesa village) Hopi cultivated about 2400 acres in the 1890's, whereas in the 1960's, Bradfield (1971) recorded only 920 acres under cultivation by this village. In 1974, 6355 acres of "annually or intermittently" cultivated farmland were noted in the Hopi Area (Bureau of Indian Affairs, 1974). For a population of 7500 Hopi, this averages about 0.8 acres per person.

The anthropological literature is rich with reports on the Hopi, and several ethnobotanists have described the numerous wild and cultivated plant foods that contributed to the traditional diet. Accounts made in the late 1890's and after permit a compilation of the foods the Hopi included in their indigenous diet (Table II). More than 60 different dishes, most of them containing some form of corn, have been described by Fewkes (1896), Hough (1897), Beaglehole (1937), Whiting (1939), Bartlett (1943) and Nequatewa (1943). This report describes the contemporary patterns of food intake among Hopi children and women homemakers, and identifies many of the reservation-grown foods and traditionally prepared dishes still being used.

METHODS

After obtaining approval of the Hopi Tribal Council and consent from parents, dietary recalls were taken from 343 children attending classes in five schools on the reservation in September, 1974. The questionnaire was distributed after a brief discussion with each class about the purpose of the study, which included some information about the high mineral content of many Hopi foods (Calloway, Glanque and Costa, 1974). Children from all elementary grades were included; however, a majority (60 percent) of the children were in the 4th through 7th grades. One 24-hour recall was taken from each child, and the days recalled were Sunday through Thursday. 17 percent of the records were of the non-school day. Each respondent was asked to list all foods and beverages consumed during the previous day, and to answer a few questions to assist in appraising the extent of indigenous food consumption. In addition, the children were asked to indicate which food items, if any, in the recall had been grown by their families or friends in Hopiland.

Information on the food intake of Hopi women was obtained from the regular records of the Expanded Food and Nutrition Education Program (EFNEP). These written records were taken in the women's homes by Hopi EFNEP aides on standardized forms (FHO: 1971-443-228), from 1969-1972. One-hundred-and-one recalls, which listed all foods and beverages consumed in the last 24-hours, were examined. One to three records each were taken from 66 homemakers, aged 20 to 89 years, at different times during the year. The seasonal spread of records are shown in Table I.

TABLE I

Distribution of Hopi Indian food records by season.	
Months	Number of records
Dec.—Jan.—Feb.	36
Mar.—Apr.—May	17
June—July—Aug.	16
Sept.—Oct.—Nov.	32
Total	101

Although the recalls were taken on 343 children (319 of these recalls were usable) and 66 women homemakers on the reservation, the foods listed are judged to be characteristic of those presented to a representative sample of approximately 7500 reservation-resident Hopi. The surveyed children numbered at least half of the total elementary school-age children, many with siblings in the unsurveyed group. Since it can be assumed that portion-size, rather than menu item varies among age groups in both home and school meals, the menus probably represented those of most of the reservation children. By the same token, food eaten by the 66 homemakers were probably also served to their families, the total population being 417 individuals. By chance, a few children who gave recalls were members of the immediate or extended home-makers' families whose records were taken 2-4 years earlier, but the difference in time and consistency within and between groups did not justify a separate tally of these records. Also, there were no distinct patterns in the two or three recalls taken from the same women in different months. Some of the oldest and youngest families who did not have children in school and who did not participate in the EFNEP program because of

disinterest or income disqualification were not represented. Many of the extended families living in a household included older people and young children, and they were thereby represented in the women's records.

The problems inherent in recalls of this type are many, and have been previously discussed by Calloway and Gibbs (1976), Meredith *et al.* (1951), and Emmons and Hayes (1973). However, within the Native American community today, where there is considerable sensitivity to probes and investigations by Whites, these techniques were the least invasive, and thereby not only more reliable, but very likely the only dietary records obtainable.

Since the records were not sufficiently accurate to calculate personal nutrient intakes, the nutritional value of the typical diets of Hopi children and women were approximated after food-frequency tables were prepared. Food-frequencies of women's records from September were tabulated separately for comparison to the children's records, and the school lunch meals were separated for comparison to the children's total diet and to lunch served at home.

RESULTS AND DISCUSSION

Food Patterns

The extensive variety of foods in the records of both women and children contained a majority of items which were not part of the traditional corn-beans-squash diet the Hopi carved from their native environment. Canned foods of all kinds, sliced wheat bread, margarine, pop and "Kool-Aid," milk, fish, rice, and refined flour products are among the most frequently mentioned "new" foods. As early as the Mission period, the Hopi were noted to be eager to try new foods, and this experimentation has led to an acceptance of many foods introduced by visitors, trading posts, and modern markets. In fact, today the dietary mix is much like that found elsewhere in America.

Although most Hopi have traditional corn foods on festive and ceremonial occasions, the records of the women surveyed indicate that a traditionally prepared corn item is included in daily menus about 17 percent of the time. The children's harvest-season records reveal that on the previous day, 69 percent had at least one food grown in Hopiland, including 23 percent who had at least one traditionally prepared corn dish. The