Two Studies of Health and Religion in Utah:

Tobacco Smoking and Cancer in Utah

Ray M. Merrill, Ph.D., M.P.H.

CHRONIC ILLNESS IS WIDESPREAD in society and touches all our lives. Behind cardiovascular diseases, cancer is the second leading form of chronic illness in the United States.[1] Considerable health resources have been utilized to prevent and control cancer. Although genetic predisposition and age are leading risk factors for cancer, lifestyle behaviors can also influence its occurrence. For example, tobacco smoking has been linked to cancers of the oral cavity and pharynx, esophagus, pancreas, larynx, lung and bronchus, urinary bladder, kidney and renal pelvis, and cervix.[2] Perhaps no single behavioral change is known that would have as great an impact on deaths attributed to cancer, particularly of the lung, as abstention from tobacco.[3]

The first epidemiological reports suggesting a link between tobacco smoking and lung cancer appeared in the early 1950s.[4] By the time of the 1964 Surgeon General's Report, there had been twenty-nine case-control studies and seven prospective cohort studies published indicating a sig-

1. Robert T. Greenlee, et al., "Cancer Statistics, 2000," *CA Cancer Journal for Clinicians* 50 (2000): 7-33.

2. United States Department of Health and Human Services, *Reducing the Health Consequences of Smoking: 25 Years of Progress: A Report of the Surgeon General, 1989*, DHHS Publication no. (CDC) 89-8411 (Rockville, Md.: Centers for Disease Control, Office on Smoking and Health, 1989).

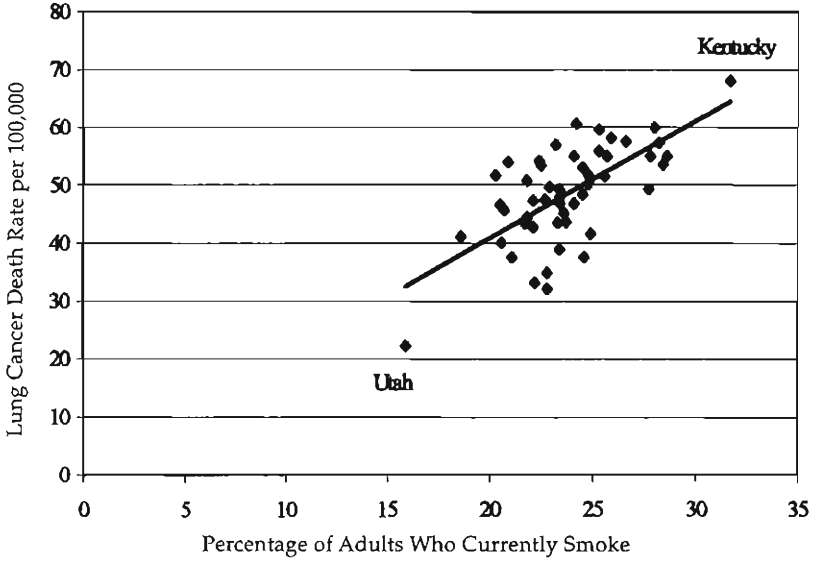
3. Richard Doll and Richard Peto, "The Causes of Cancer," *Journal of the National Cancer Institute* 66 (1981): 1191-1308.

4. Richard Doll and A. B. Hill, "Smoking and Carcinoma of the Lung: Preliminary Report," *British Medical Journal* (1950) 2: 739; Roy Norr, "Cancer by the Carton," *Reader's*

nificantly increased risk of lung cancer among tobacco smokers.[5] In Utah, the percentage of adults eighteen years of age and older who smoke cigarettes has historically been considerably lower than in the rest of the United States.[6] Consequently, Utahns experience the lowest overall cancer incidence and mortality rates in the nation. *Figure 1* shows the positive association between tobacco smoking and lung cancer mortality among the fifty United States, with Utah having the lowest and Kentucky the highest levels of smoking and lung cancer mortality.

A number of studies have looked at the influence of church activity

FIGURE 1: Currently Smoke



Data sources: Behavior Risk Factor Surveillance System and the National Center for Health Statistics, 1996. Rates age-adjusted to the 1970 United States standard population

Digest (December 1952): 7-8; "Cigarettes. What CU's Test Showed: The Industry and Its Advertising; and How Harmful Are They?" *Consumer Reports* 18 (February 1953): 58-74; Lois M. Miller and James Monahan, "The Facts Behind the Cigarette Controversy," *Reader's Digest* (July 1954): 1-6; "Tobacco Smoking and Lung Cancer," *Consumer Reports* 19 (February 1954): 54, 92.

5. United States Department of Health and Human Services, "Smoking and Health: Report of the Advisory Committee to the Surgeon General of the Public Health Service," P.H.S. Publication no. 1103. (Washington, D.C.: U.S. Government Printing Office, 1964).

6. Ray M. Merrill, Gordon B. Lindsay, and Joseph L. Lyon, "Tobacco-related Cancers in Utah Compared to the United States: Quantifying the Benefits of the Word of Wisdom," *BYU Studies* 38, no. 4 (1999): 91-114.

on cancer among Latter-day Saint men and women.[7] In each of these studies, religiously active Latter-day Saints showed lower levels of cancer and longer life expectancy than did less active members. In order to obtain a current report of religious preference, church activity, and tobacco smoking prevalence in Utah, we added two questions on religion and church attendance to the Utah Behavior Risk Factor Surveillance System (BRFSS).[8] The results presented in this report were based on 782 respondents in February through April 2000.

Respondents to the Utah survey indicated their religious preferences as: 69 percent LDS, 21 percent other religions, and 10 percent no religion. Church attendance for those who specified having a religious preference is shown in Table 1. In general, Latter-day Saints are comparatively very active in church. Women attend church more frequently than men, regardless of religious preference.

Table 1
Summary of Church Attendance by Religious Preference
Among Adults 18 Years of Age or Older in Utah

	Religious Preference by Gender			
Church	LDS		Other Religions	
Attendance	Men	Women	Men	Women
Weekly	71%	81%	15%	37%
Monthly[a]	12%	6%	32%	18%
Yearly[b]	6%	8%	24%	13%
Not at All	11%	5%	29%	32%

Data source: Utah Behavior Risk Factor Surveillance System, 2000.
[a]Between one and three times monthly.
[b]Between one and eleven times yearly.

A strong association between religious preference and smoking was observed. About 6 percent of Latter-day Saints are current smokers. In contrast, 22 percent of people with other religious preference and 46 percent of those with no religious preference are current smokers. Table 2 shows that tobacco smoking among Latter-day Saints occurs almost exclusively in less active members. People of other religious preference who

7. James E. Enstrom, "Cancer and Total Mortality Among Active Mormons," *Cancer* 42 (1978): 1943-51; John W. Gardner and Joseph L. Lyon, "Cancer in Utah Mormon Men by Lay Priesthood Level," *American Journal of Epidemiology* 116 (1982): 243-57; John W. Gardner and Joseph L. Lyon, "Cancer in Utah Mormon Women by Church Activity Level," *American Journal of Epidemiology* 116 (1982): 258-65.

8. Since 1984, the Centers for Disease Control and Prevention have collaborated with states such as Utah to collect survey data on disease risk factor behaviors like tobacco smoking.

smoke are also less religiously active. Compared with Latter-day Saints, the percentage of tobacco smokers is considerably higher in men and women of other religious preference or in those with no religious preference. As a matter of comparison, in 2000 the national percentages of current tobacco smoking were 24 percent for men and 21 percent for women.[9]

Table 2
Percentage of Current Smokers according to Religious Preference, Church Attendance, and Gender among Adults 18 Year of Age or Older in Utah

	Religious Preference by Gender					
Church Attendance	LDS		Other Religions		No Religion	
	Men	Women	Men	Women	Men	Women
Weekly	1%	0.3%	10%	13%		
Monthly[a]	21%	10%	32%	—[c]		
Yearly[b]	31%	33%	14%	23%		
Not at All	21%	52%	38%	35%		
Total	6%	6%	25%	19%	49%	41%

Data source: Utah Behavior Risk Factor Surveillance System, 2000.
[a]Between one and three times monthly.
[b]Between one and eleven times yearly.
[c]Insufficient numbers to compute.

Although the focus of this paper has been tobacco-related cancers, cigarette smoking is also a major contributor to other chronic conditions, such as diseases of the heart and stroke.[10] There are also several other causes of cancer, some of which can be moderated through behavior such as diet and exercise, but many of which cannot (e.g., those resulting from genetic predisposition and age). Certainly Latter-day Saints are not immune to cancer and other chronic illnesses, but a recent study showed that during 1991-1995, lower tobacco-smoking prevalence in Utah compared with the rest of the country resulted in an estimated 4,294 fewer cancer deaths in men and 3,047 fewer cancer deaths in women.[11]

9. Nationwide Tobacco Use, Behavior Risk Factor Surveillance System, 2002. Available at http://apps.nccd.cdc.gov/brfss/index.asp.

10. Nancy A. Rigotti and Richard C. Pasternak, "Cigarette Smoking and Coronary Heart Disease: Risks and Management," *Cardiology Clinics* 14 (1996): 51-68; Roger Shinton, "Lifelong Exposures and the Potential for Stroke Prevention: The Contribution of Cigarette Smoking, Exercise, and Body Fat," *Journal of Epidemiology and Community Health* 51 (1997): 138-43; United States Department of Health and Human Services, "The Health Benefits of Smoking Cessation: A Report of the Surgeon General 1990," DHHS Publication no. (CDC) 90-8416 (Rockville, Md.: Centers for Disease Control, Center for Chronic Disease Prevention and Health Promotion, Office on Smoking and Health, 1990).

11. Merrill, Lindsay, and Lyon, "Tobacco-related Cancers in Utah."

In 1833, members of the LDS church were first taught that "tobacco. . . is not good for man." This instruction appeared as part of a health code called the Word of Wisdom (D&C 89). Originally many members treated this as a guideline and not necessarily a commandment. Previous works have identified certain events resulting in the widespread adoption by the church of the Word of Wisdom as a commandment.[12] Not until May 5, 1898 did the First Presidency and the Twelve agree that the Word of Wisdom was a commandment that should be followed explicitly. However, it took several more years before this doctrine was fully enforced. In June 1902, Joseph F. Smith urged church leaders to refuse to authorize temple recommends for flagrant violators of the Word of Wisdom, but to be liberal with old men using tobacco. In December 1915, President Smith said that abstention from tobacco among men with experience in the church was a prerequisite to being ordained to the priesthood or permitted to enter the temple. In 1921, after Heber J. Grant became president of the church, adherence to the Word of Wisdom became less flexible, and over the next decade refraining from tobacco and other substances was required of all members for full fellowship and admittance to the temple.

Studies linking tobacco smoking with a number of cancers and other diseases has led to a decrease in the percentage of adults who currently smoke in the United States, from nearly 45 percent in the 1960s to about 25 percent in the 1980s and 1990s.[13] In 1985, the first year cigarette-smoking prevalence was recorded in Utah, the number of adults smoking was 15.6 percent.[14] This rate has varied only slightly to the present time. As a result, substantial differences exist between the tobacco-related cancer burden in Utah versus the United States. As the nation forms its health policy goals and standards, Utah's low tobacco use and relatively low cancer burden serves as a model, with the influence of religious forces clearly evident.

12. Thomas G. Alexander, "The Word of Wisdom: From Principle to Requirement," *Dialogue* 14 (Fall, 1981): 78-88. Thomas G. Alexander, *Mormonism in Transition: A History of the Latter-day Saints, 1890-1930* (Urbana and Chicago: University of Illinois Press, 1986).

13. Merrill, Lindsay, and Lyon, "Tobacco-related Cancers in Utah."

14. Ibid.

Active Religion and Health in Utah

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RELIGIOUS ACTIVITY IS FREQUENTLY ASSOCIATED with health and lifestyle behaviors, such as abstaining from tobacco use and alcohol abuse, which directly influence physical and mental health outcomes.[1] In recent decades, the adult population in Utah has experienced the lowest overall cancer and heart disease incidence and mortality rates in the United States.[2] Studies have shown that these favorable health outcomes are explained, at least in part, by the health doctrine of the Church of Jesus Christ of Latter-day Saints (LDS).[3] Other studies have looked specifically at the influence of church activity on cancer and total mortality in LDS men and women.[4] In each of these studies, religiously active Latter-day Saints experienced lower levels of cancer and longer life expectancy

1. Lisa Miller et al., "Religiosity as a Protective Factor in Depressive Disorder," *American Journal of Psychiatry* 156 (1999): 808-10; A. W. Braam et al., "Religiosity as a Protective or Prognostic Factor of Depression in Later Life; Results from a Community Survey in The Netherlands," *Acta Psychiatrica Scandinavica* 96 (1997): 199-205.

2. Greenlee et al., "Cancer Statistics, 2000"; Joseph L. Lyon et al., "Cardiovascular Mortality in Mormons and Non-Mormons in Utah, 1969-1971," *American Journal of Epidemiology* 108 (1978): 357-66; Merrill, Lindsay, and Lyon, "Tobacco-related Cancers in Utah."

3. Lyon et al., "Cardiovascular Mortality"; Joseph L. Lyon, John W. Gardner, and Dee W. West, "Cancer Incidence in Mormons and Non-Mormons in Utah During 1967-75," *Journal of the National Cancer Institute* 65 (1980): 1055-61; James E. Enstrom, "Cancer Mortality Among Mormons," *Cancer* 36 (1975): 825-41; Joseph L. Lyon et al., "Cancer Incidence in Mormons and Non-Mormons in Utah, 1966-1970," *New England Journal of Medicine* 294 (1976): 129-33; Joseph L. Lyon, John W. Gardner, and Dee W. West, "Cancer Risk and Lifestyle: Cancer Among Mormons From 1967-1975," *Basic Life Sciences* 43 (1988): 137-61; James E. Enstrom, "Cancer Mortality Among Mormons in California During 1968-75," *Journal of the National Cancer Institute* 65 (1980): 1073-82.

4. Enstrom, "Cancer and Total Mortality"; Gardner and Lyon, "Cancer in Utah Mormon Men"; Gardner and Lyon, "Cancer in Utah Mormon Women"; "Smoking and Health: A Physician's Responsibility (A Statement of the Joint Committee on Smoking and Health, American College of Chest Physicians, American Thoracic Society, Asian Pacific Society of Respirology, Canadian Thoracic Society, European Respiratory Society, International Union against Tuberculosis and Lung Disease)," *Respirology* 1 (1996): 73-77.

than did less active members. This suggests that health and lifestyle behaviors among less active Latter-day Saints, such as cigarette smoking and alcohol abuse, differ considerably from those among active members.[5] Other behavior differences may also be suggested, such as premarital and extramarital sexual relations, less education, or physical inactivity, which are behaviors associated with an increased risk of physical and mental health problems.[6] On the other hand, regular LDS church attendance suggests acceptance of health and moral standards espoused by the church.

Weekly church attendance is an important part of personal worship and worthiness in the LDS church.[7] This paper provides a contrasting picture of the health profiles of Latter-day Saints in Utah who attend church weekly (active) versus those who attend less than weekly (less active). It also considers general health status for those of other religious preferences or with no religious preference.

Methods

Data Collection

This analysis was based on a cross-sectional random survey conducted in Utah in 1996 called the Utah Health Status Survey. The Utah Department of Health contracted with the Gallup Organization to collect the data. Gallup incorporated the telephone survey instrument into a computer-assisted random digit dialing software program called SUR-

5. Arria et al., "Self-reported Health Problems and Physical Symptomatology in Adolescent Alcohol Abusers," *Journal of Adolescent Health* 16 (1995): 226-31; "Anthony F. Jorm et al., "Smoking and Mental Health: Results from a Community Survey," *Medical Journal of Australia* 170(1999): 74-77; J. R. Copeland et al., "Community-based Case-control Study of Depression in Older People: Cases and Sub-cases From the MRC-ALPHA Study," *British Journal of Psychiatry* 175 (1999): 340-47; Anita R. Dixit and Rosa M. Crum, "Prospective Study of Depression and Risk of Heavy Alcohol Use in Women," *American Journal of Psychiatry* 157 (2000): 751-58; E. Rodriguez et al., "Unemployment, Depression, and Health: A Look at the African-American Community," *Journal of Epidemiology and Community Health* 53 (1999): 335-42.

6. E. J. Hauenstein and M. R. Boyd, "Depressive Symptoms in Young Women of the Piedmont: Prevalence in Rural Women," *Women and Health* 21 (1994): 105-23; D. C. Spendlove, Dee W. West, and W. M. Stanish, "Risk Factors and the Prevalence of Depression in Mormon Women," *Social Science and Medicine* 18 (1984): 491-95; R. Reviere and I. W. Eberstein, "Work, Marital Status, and Heart Disease," *Health Care for Women International* 13 (1992): 393-99; I. Suzuki et al., "Cardiovascular Fitness, Physical Activity and Selected Coronary Heart Disease Risk Factors in Adults," *Journal of Sports Medicine and Physical Fitness* 38 (1998): 149-57.

7. Melchizedek Priesthood Leadership Handbook, "Official Policies and Announcements," *Deseret News*, Church News section, 23 May 1998, 2.

VENT. Interviews were conducted by trained interviewers in a supervised environment across twelve local health districts in Utah. Computer-assisted telephone interviewing was chosen in order to achieve a higher response rate, to yield a more representative sample, and to reduce non-sampling error by standardizing the data collection process. Errors in data entry were minimized by preventing interviewers from entering non-valid codes. The process was also efficient because interviewers entered responses directly into the database.

The survey questionnaire was divided into several core module questions. Data on the presence of chronic medical conditions was solicited, as well as questions covering topics such as demographic characteristics, health, lifestyle, and chronic conditions. The interview process occurred from June 1 to August 31, 1996. The survey interview was conducted with one randomly selected adult age 18 or older in each household. The response rate was 66.3 percent, with 6,188 respondents for study.

Sample Design and Weighting

A complex survey sample design was used in order to provide a representative sample of all Utahns. It may be described as a weighted probability sample of households disproportionately stratified by twelve local health districts covering the state. Respondents from 500 households were interviewed in each health district, except for the Salt Lake City Health District, where respondents from 800 households were interviewed in order to increase precision in the statewide estimates. A single state, non-clustered, equal probability of selection telephone calling design was used to generate telephone numbers.[8] Post-survey weighting adjustments were made so that survey results could be more accurately generalized to the Utah population. Adjustments weighted the sample to be proportionally consistent with age, sex, geographic, and Hispanic status distribution of the 1996 Utah population.

Statistical Methods

Estimating sampling error for a complex survey design involves special statistical techniques. Standard errors of the survey estimates employed a Taylor-series expansion which accounts for the complex survey design. SAS (version 8.0)—callable SUDAAN was used for data

8. R. M. Casady and J. M. Lepowski, "Stratified Telephone Survey Designs," *Survey Methodology* 19 (1993): 103-21.

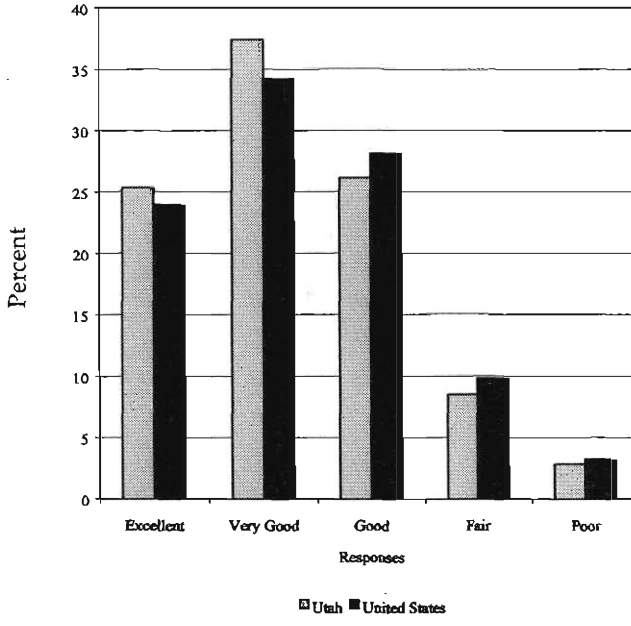
analysis.[9] Weighted frequency and percentage distributions for two-way tabulations were computed. The chi-square test is used for evaluating independence. Tests of significance were based on the 0.05 level.

Results

Survey-respondents 18 years or older consisted of 69 percent LDS, 21 percent non-LDS, and 10 percent with no religious preference. Latter-day Saints were significantly more likely to be religiously active than were non-Latter-day Saints, with approximately 71 percent attending church weekly. In contrast, 33 percent of non-LDS attended church weekly. Weekly church attendance for the adult population in Utah is roughly 56 percent.

Figure 1 presents self-reported general health status for adults aged

FIGURE 1. Self-reported General Health Status for Adults 18 Years or Older in Utah and the United States



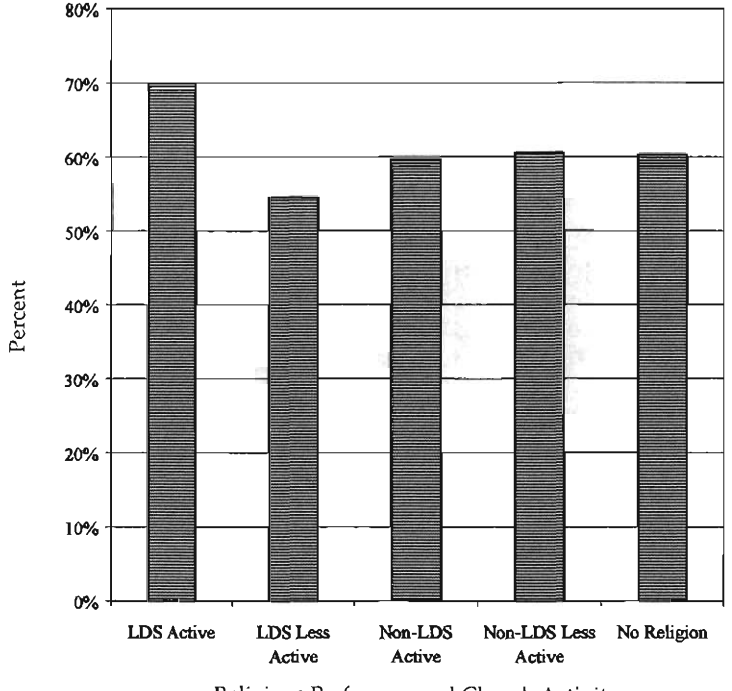
Data source: Behavior Risk Factor Surveillance Survey, 199

9. SUDAAN. Software for the Statistical Analysis of Correlated Data. SUDAAN Release 7.5.4 for PCs, Research Triangle Park, North Carolina. Copyright March, 2000.

18 years or older in Utah compared to the United States. A higher percentage of people in Utah reported having excellent or very good health. Figure 2 shows that in Utah, the percentage reporting excellent or very good health was highest for Latter-day Saints who attended church weekly (active) and lowest for Latter-day Saints who attended less than once a week (less active). The percentage reporting excellent or very good health was similar for religiously active and less active non-LDS, and for those with no religion.

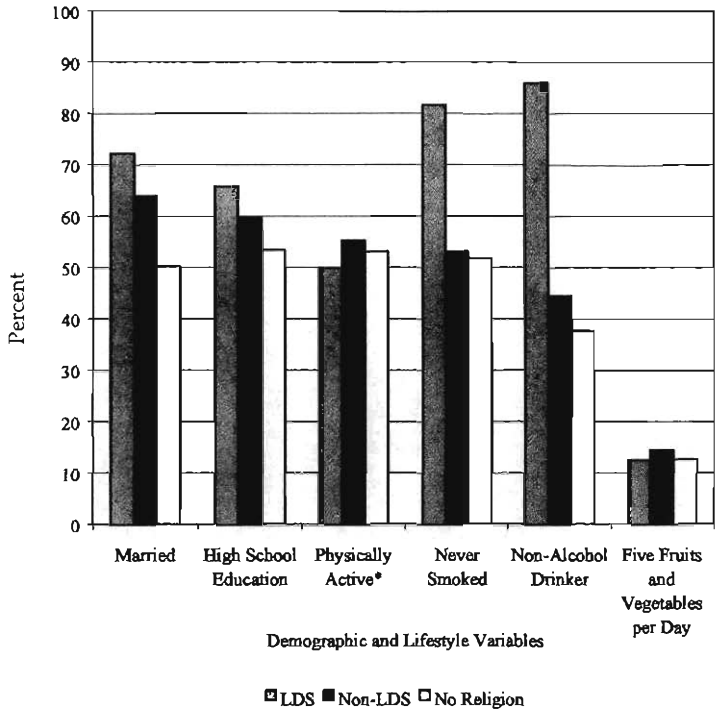
Figure 3 presents the percentage of LDS, non-LDS, and those with no religious preference in Utah, aged 18 years or older, according to select demographic and lifestyle variables. Latter-day Saints, when compared to non-Latter-day Saints and to those with no religious preference, are more likely to be married, have a high school education, never smoke, and abstain from alcohol. There was no significant difference between

FIGURE 2. Percentage of Adults 18 Years or Older Reporting to Have Excellent or Very Good Health According to Religious Preference and Church Activity



Data source: 1996 Utah Health Status Survey
Active: Attends church weekly. Less active: Attends church less than once a week

FIGURE 3. Percentage of Adults 18 Years or Older in Utah According to Religious Preference and Select Demographic and Lifestyle Variables



Data source: 1996 Utah Health Status Survey
*Vigorous exercise 20 minutes at least three times per week

religious preferences in eating five fruits and vegetables per day. Latter-day Saints are significantly less likely than non-Latter-day Saints and those with no religious preference to exercise twenty minutes at least three times a week.

The remainder of the results focuses on religiously active and less active Latter-day Saints. The distribution of LDS respondents 18 years of age or older to the 1996 Utah Health Status Survey is reported according to church attendance and demographic variables (Table 1), lifestyle variables (Table 2), general health status (Table 3), and chronic medical conditions (Table 4). The percentage of active LDS significantly varies according to gender, marital status, education, and income. Active LDS represent a significantly higher percentage of women, married, with a high school education, and with an annual household income greater than $35,000.

Table 1
Distribution of LDS Respondents 18 Years of Age or Older to the 1996 Utah Health Status Survey According to Church Activity (Active, Less Active) and Demographic Characteristics

Variables	LDS Active	LDS Less Active	Percent Active	Chi square	P value
Gender					
Men	45.2%	52.3%	67.8%		
Women	54.8%	47.7%	73.7%		
	n = 3,039	n = 1,248		7.12	0.0077
Age					
18-24	19.6%	17.4%	73.0%		
25-34	20.9%	19.7%	71.9%		
35-44	18.6%	18.7%	70.5%		
45-54	15.0%	15.6%	69.8%		
55+	25.9%	28.6%	68.6%		
	n = 2,915	n = 1,212		2.06	0.7240
Married					
Yes	76.2%	62.7%	74.8%		
No	23.8%	37.3%	60.8%		
	n = 3,039	n = 1,248		29.03	0.0000
High School Education					
Yes	74.1%	46.0%	79.7%		
No	25.9%	54.0%	53.9%		
	n = 3,037	n = 1,247		112.42	0.0000
Annual Household Income					
Less than $ 15,000	5.9%	8.2%	63.4%		
$15,000-($35,000	28.3%	32.4%	67.8%		
$35,000-<$55,000	33.5%	36.0%	69.0%		
$55,000 or more	32.3%	23.4%	76.8%		
	n = 2,706	n = 1,128		33.17	0.0001

Active: attends church at least once a week.
Less Active: attends church less than once a week.
Percent active refers to the percentage active in church by row category (e.g., of men, 67.8 percent are active).

Table 2
Distribution of LDS Respondents 18 Years of Age or Older to the 1996 Utah Health Status Survey According to Church Activity (Active, Less Active) and Lifestyle Characteristics

Variables	LDS Active	LDS Less Active	Percent Active	Chi square	P value
Physically Active*					
Yes	52.3%	44.5%	74.2%		
No	47.7%	55.5%	67.7%		
	n = 3,028	n = 1,241		8.62	0.0033
Five Fruits and Vegetables Per Day					
Yes	14.4%	8.1%	81.6%		
No	85.6%	91.9%	69.8%		
	n = 2,971	n = 1,198		14.62	0.0001
Alcohol Consumption (Drinks)					
Nondrinker	98.5%	55.9%	81.1%		
<60 per month	1.5%	40.6%	8.3%		
60+ per month	0.0%	3.5%	0.0%		
	n = 3,019	n = 1,240		272.96	0.0000
Smoking Status					
Never Smoked	92.6%	54.9%	80.4%		
Former Smoker	7.0%	23.7%	41.9%		
Current Smoker	0.4%	21.4%	4.0%		
	n = 3,028	n = 1,245		218.47	0.0000

Active: attends church at least once a week.
Less Active: attends church less than once a week.
Percent active refers to the percentage active in church by row.
*Vigorous exercise for twenty minutes at least three times a week.

Table 3
Distribution Of LDS Respondents 18 Years of Age or Older to the 1996 Utah Health Status Survey according to Church Activity (Active, Less Active) and General Health Status

Variables	LDS Active	LDS Less Active	Percent Active	Chi square	P value
In past four weeks accomplished less than desired because of poor physical health					
Yes	20.4%	25.4%	66.3%		
No	79.6%	64.6%	72.4%		
	n = 3,036	n = 1,238		4.74	0.0295
In past four weeks limited in work or other activities because of poor physical health					
Yes	16.9%	22.9%	64.4%		
No	83.1%	77.1%	72.5%		
	n = 3,036	n = 1,241		7.18	0.0074
In past four weeks physical pain interfered with normal work					
Not at all	62.6%	56.2%	73.2%		
A Little Bit	25.0%	23.7%	72.0%		
Moderately	7.5%	10.0%	64.6%		
Quite a Bit	3.8%	7.4%	55.9%		
Extremely	1.1%	2.7%	49.3%		
	n = 3,035	n = 1,241		16.96	0.0020
Time in past four week that felt calm and peaceful					
All the time	10.6%	7.3%	78.1%		
Most of the time	57.2%	48.7%	74.1%		
A good bit	17.0%	17.4%	70.4%		
Some of the time	10.7%	18.2%	58.9%		
A Little	4.0%	6.5%	60.2%		
None	1.9%	0.5%	39.3%		
	n = 3,033	n = 1,244	32.82		0.0000
Time in past four week that felt downhearted and blue					
All the time	0.4%	1.1%	47.6%		
Most of the time	1.6%	3.9%	49.9%		
A good bit	3.0%	4.3%	62.6%		
Some of the time	11.5%	15.1%	64.8%		
A Little	41.1%	35.1%	73.9%		
None	42.6%	40.5%	28.1%		
	n = 3,027	n = 1,247		0.03	0.8699

Active: attends church at least once a week
Less Active: attends church less than once a week.
Percent active refers to the percentage active in church by row category.

Table 4
Distribution of LDS Respondents 18 Years of Age or Older to the 1996 Utah Health Status Survey according to Church Activity (Active, Less Active) and Chronic Medical Conditions

Variables	LDS Active	LDS Less Active	Percent Active	Chi square	P value
History of High Blood Pressure					
Yes	18.4%	23.8%	65.3%		
No	81.6%	76.2%	72.3%		
	n = 3,034	n = 1,247		6.04	0.0140
History of High Cholesterol					
Yes	25.2%	27.8%	70.5%		
No	74.8%	75.2%	73.2%		
	n = 2,188	n = 831		0.81	0.3681
History of Diabetes					
Yes	5.0%	7.4%	62.2%		
No	95.0%	92.6%	71.5%		
	n = 3,024	n = 1,239		3.12	0.0774
History of Asthma					
Yes	4.2%	6.3%	61.9%		
No	95.8%	93.7%	71.3%		
	n = 3, 038	n = 1,248		2.85	0.0912
History of Arthritis					
Yes	8.9%	12.2%	64.1%		
No	91.1%	87.8%	71.7%		
	n = 3, 034	n = 1,243		3.38	0.0661
History of Heart Disease					
Yes	4.3%	7.2%	59.0%		
No	95.7%	92.8%	71.5%		
	n = 3,038	n = 1,247		4.11	0.0428
History of Stroke					
Yes	1.2%	1.7%	63.7%		
No	98.8%	98.3%	71.0%		
	n = 3,036	n = 1,247		0.64	0.4248

Active: attends church at least once a week.
Less Active: attends church less than once a week.

Church activity significantly varies across the levels of the lifestyle variables (Table 2). The percentage of LDS who are active in church is significantly greater for people who are physically active, eat five fruits and vegetables per day, do not consume alcohol, and have never smoked. Active Latter-day Saints compared with those less active have a significantly higher percentage of people who vigorously exercise for twenty minutes at least three times a week, eat five fruits and vegetables per day, are nondrinkers, and have never smoked. Almost no active Latter-day Saints reported consuming alcohol or smoking cigarettes. In contrast, the percentage of active non-LDS in Utah who reported consuming alcohol is 59 percent and who currently smoke is above 8 percent.

General health status variables indicate that better physical and mental health are associated with being active in church (Table 3). Latter-day Saints who reported that they accomplish less than desired, or that their work or other activities are limited because of poor physical health, were significantly less likely to be active in church. The extent that physical pain interferes with normal work is negatively related to church activity. Feelings of calm and peace are positively related to church activity, whereas being downhearted and blue (discouraged) is not significantly related to church activity. Percentages of active LDS who accomplish less than desired or experience limited work or other activities because of poor physical health were significantly lower than for less active LDS.

Several chronic medical conditions were compared between active and less active Latter-day Saints (Table 4). Those with a history of high blood pressure or heart disease are significantly less active in church. Latter-day Saints with a history of diabetes, asthma, or arthritis also may be less active in church (although the results are marginally insignificant at the 0.05 level). Percentages having a history of high blood pressure or a history of heart disease (e.g., angina, congestive heart failure, or heart attack) were significantly lower for active LDS compared with less active LDS.

Discussion

The results provide a description of demographics, health status, lifestyle behaviors, and chronic medical conditions for active and less active Latter-day Saints. This is the first report to provide such a comprehensive picture of these characteristics. The results also confirm that health status and lifestyle behaviors are associated with church attendance.

Active Latter-day Saints are more likely to be female, married, have a high school education, a higher annual household income, be physically active, eat five fruits and vegetables per day, have never smoked, and do not drink alcohol when compared with less active members. These factors have been shown to be protective against several chronic

conditions.[10] History of high blood pressure, heart disease, diabetes, asthma, and arthritis were lower for active versus less active Latter-day Saints. Less active LDS were more likely to report accomplishing less than desired or being limited in doing their normal activities because of poor physical health in the past four weeks. Other studies have shown that people who do not attend church regularly are more likely to be unhealthy and experience anxiety, depression, and emotional problems.[11] On the other hand, active Latter-day Saints were more likely to report feeling calm and peaceful over the past four weeks.

The results also show that Latter-day Saints who consume sixty or more alcoholic drinks per month or who currently smoke are rarely active members of the church. Because of the strict health code in the LDS church proscribing tobacco use or consumption of alcohol, coffee, and tea (D&C 89), those who use such substances may feel uncomfortable attending church services. They may also be more likely to experience health problems, making it difficult to attend their meetings. While we do not attempt to sort out this complex situation, further investigation of church inactivity among Latter-day Saints is needed.

We do not expect that bias influenced the results. There is no reason to believe that religion would influence whether a person chose to participate in the study, particularly since the questions about religion and church attendance were asked near the end of the questionnaire. Further, response rates for each variable were above 99 percent, except for age (96 percent), annual household income (89 percent), five fruits and vegetables per day (97 percent), and history of high cholesterol (70 percent). Yet these percentages were similar between active and less active Latter-day Saints.

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10. Arria et al., "Self-reported Health Problems"; Jorn et al., "Smoking and Mental Health"; Copeland et al., "Community-based Case-Control Study of Depression"; Rodriguez et al., "Unemployment, Depression, and Health"; Reviere and Eberstein, "Work, Marital Status, and Heart Disease"; Suzuki et al., "Cardiovascular Fitness"; T. Baranowski et al., "Gimme Five Fruit, Juice and Vegetables for Fun and Health Outcome Evaluation," *Health Education and Behaviors* 27 (2000) 96-111; P. Veer et al., "Fruits and Vegetables in the Prevention of Cancer and Cardiovascular Disease," *Public Health Nutrition* 3 (2000): 103-7; T. Lloyd et al., "Fruit Consumption, Fitness, and Cardiovascular Health in Female Adolescents: The Penn State Young Women's Health Study," *American Journal of Clinical Nutrition* 67 (1998): 624-30.

11. F. Luskin, "Review of the Effect of Spiritual and Religious Factors on Mortality and Morbidity with a Focus on Cardiovascular and Pulmonary disease," *Journal of Cardiopulmonary Rehabilitation* 20 (2000): 8-15; R. A. Hummer et al., "Religious Involvement and U.S. Adult Mortality," *Demography* 36 (1999): 273-85; D. A. Matthews et al., "Religious Commitment and Health Status: A Review of the Research and Implications for Family Medicine," *Archives of Family Medicine* 7 (1998): 118-24; H. G. Koenig et al., "Modeling the Cross-sectional Relationships between Religion, Physical Health, Social Support and Depressive Symptoms," *American Journal of Geriatric Psychiatry* 5 (1997): 131-44.

Conclusion

The superior health experienced in Utah, and particularly among Latter-day Saints, is associated with church attendance. Approximately 69 percent of the adult population in Utah is LDS, and 71 percent of these attend church weekly. Attending church weekly promotes health and lifestyle choices, unique in many ways to the church, which result in relatively high levels of health and well being. Specifically, active LDS church members are more likely to be female, married, have a high school education, a higher annual household income, be physically active, eat five fruits and vegetables per day, never have smoked, and abstain from alcohol. Each of these factors is positively associated with better physical and psychological health. This research is an important step toward better understanding general health status, lifestyle, and chronic disease profiles of active versus less active Latter-day Saints. Less active LDS are an extremely high-risk population for chronic disease conditions.