

Review

# The Global Influence of the Seventh-Day Adventist Church on Diet

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**Abstract:** The emphasis on health ministry within the Seventh-day Adventist (SDA) movement led to the development of sanitariums in mid-nineteenth century America. These facilities, the most notable being in Battle Creek, Michigan, initiated the development of vegetarian foods, such as breakfast cereals and analogue meats. The SDA Church still operates a handful of food production facilities around the world. The first Battle Creek Sanitarium dietitian was co-founder of the American Dietetics Association which ultimately advocated a vegetarian diet. The SDA Church established hundreds of hospitals, colleges, and secondary schools and tens of thousands of churches around the world, all promoting a vegetarian diet. As part of the ‘health message,’ diet continues to be an important aspect of the church’s evangelistic efforts. In addition to promoting a vegetarian diet and abstinence from alcohol, the SDA church has also invested resources in demonstrating the health benefits of these practices through research. Much of that research has been conducted at Loma Linda University in southern California, where there have been three prospective cohort studies conducted over 50 years. The present study, Adventist Health Study-2, enrolled 96,194 Adventists throughout North America in 2003–2004 with funding from the National Institutes of Health. Adventist Health Studies have demonstrated that a vegetarian diet is associated with longer life and better health.

**Keywords:** vegetarian; Seventh-day Adventist; dietetics; church history; sanitarium; meat analogue; Adventist Health Studies; nutrition guidelines; soy foods; wholism

## 1. Introduction

For millennia, numerous faith traditions have encouraged adherents to limit eating meat, even if temporarily. The Seventh-day Adventist Church, which began in mid-nineteenth-century America explicitly linked theology and food to encourage a vegetarian lifestyle among present and potential believers. The Church also influenced the diet of non-members around the world through its ambitious organizational structure dedicated to education, health care, and the development and mass production of plant-based foods, such as meat analogues, breakfast cereals, and soy milk. Lastly, results of research conducted among vegetarian Adventists and at universities affiliated with the church have greatly contributed to the scientific understanding of the health effects of vegetarian diets and to dietary changes of the society at large.

Historians have noted that the religious and social upheaval of the Second Great Awakening of early to mid-nineteenth Century America produced movements such as Mormonism, Shakerism,

and Millerism (Butler 1986). When the Millerite prediction that the world would end in the early 1840's did not come to pass, a handful from that movement went into a period of reflection and reassessment, resulting in a core group of 'Adventists.' This group increased from about 200 in 1850 to 3500 when the Seventh-day Adventist church was officially organized in 1863, having wide-ranging interests such as temperance, education, and religious liberty (Butler 1986).

Historically, the SDA church began as a sect, marked by a high "state of tension" with the surrounding sociocultural environment due to factors such as prohibitions on diet and entertainment, observance of Saturday as the Sabbath, refusal to bear arms, and belief in the imminent end of the world (Lawson 1998). Over time, the Adventist church reduced those tensions, in part as a result of the educational and healthcare institutions it developed and also through legal and political accommodations (Lawson 1998).

In this review we will show the important role of diet within the theology and practice of Adventism, how the organizational and institutional structure of the church advances the Adventist perspective on diet—particularly in the marketplace, and how Adventists have used research and professional activities to advance vegetarianism in the broader society. Although this article focuses on efforts within the United States, there are examples of efforts across the world-wide church. We will be using the term 'vegetarian' as opposed to 'plant-based' to refer to the Adventist diet. However, there are also sub-groupings with this group such as vegan (no animal products), lacto-ovo-vegetarian (can include eggs and/or milk), pesco-vegetarian (can also include fish), and semi-vegetarian (eat red meat, poultry, and fish less than once per week and more than once per month) (Le and Sabate 2014).

## 2. Church Mission and Structure

### 2.1. Theology and Health Message

The SDA church has long been noted as a Bible-based church. In contrast to many Christian denominations, the church views many of the Old Testament's teachings and practices as still applicable. This is demonstrated in the church's name referencing the seventh-day Sabbath established at creation as presented in Genesis 2:1–3 and reiterated in the Mosaic covenant at Mount Sinai as written in Exodus 20:8–11. Another aspect of the creation account appreciated by Adventists is that the initial human diet was proclaimed by God as drawing on "every seed-bearing plant on the face of the whole earth and every tree that has fruit with seed in it" (Genesis 1:29 New International Version).

The church does not have a formal creed, but has published a list of fundamental beliefs (28 Fundamental Beliefs 2015). Fundamental Belief #22 is titled "Christian Behavior." It includes the idea that the human body is the temple of the Holy Spirit and, thus, requires attentive care. Specifically regarding diet: "Along with adequate exercise and rest, we are to adopt the most healthful diet possible and abstain from the unclean foods identified in the Scriptures" (28 Fundamental Beliefs 2015). Leviticus 11:1–23 identifies 'unclean' animals such as pigs, shellfish, vultures, and bats. Ceremonially clean animals include fish with scales and fins, chickens, duck, geese, and four-legged animals which chew the cud and have split hooves, such as cattle, sheep, and goats. The concept of body as a temple was advanced early in the denomination's history. An extreme example was SMI Henry, who wrote in 1900 that the Holy Spirit could even eliminate disease and restore health, based on her experience of supernatural healing as a patient in the Battle Creek Sanitarium in 1896 (Land 2001).

One of the Church's founding leaders, and certainly its most prolific writer, was Ellen G. White, who lived from 1827 until 1915. She wrote about many topics, including diet, and may be one of the most translated woman authors in history (Sanchez et al. 2016). One of her books, *Ministry of Healing*, includes a chapter titled "Diet and Health." In that chapter she provides a number of recommendations. Some notable assertions include:

- "Grains, fruits, nuts, and vegetables constitute the diet chosen for us by our Creator" (p. 296).
- "There is more religion in a good loaf of bread than many people think" (p. 302).
- "A disordered stomach produces a disordered mind" (p. 310).

- “When it comes to diet, one person cannot lay down an exact rule for another” (p. 310).

A survey of Adventist religious faculty found that many considered *wholism* to be the church’s most important contribution to theology—more so than interpretations regarding the second advent and the seventh-day Sabbath (Bull 1990). This understanding that “a healthy mind and body directly affects one’s morals and one’s ability to discern truth” is distinct from the anthropological dualism of many Christian (Sanchez et al. 2016) as well as non-Christian faith traditions. Adventist faculty in Chile examined the social meaning of vegetarian diet, based primarily on two books: *Prophets of Health: A Study of Ellen G. White*, written by historian and former Adventist, Ronald L. Numbers (1st edition 1976, 3rd edition 2008), and the SDA response, *Messenger of the Lord* (1998) by Herbert E. Douglass. They argued that the vegetarian diet in the 1800’s ritualized the new identity of the emerging Adventist movement and also had great symbolic meaning (Sanchez et al. 2016). For example, vegetarian diet was an important part of ‘the present truth’, that is, the message that the church was to proclaim to the world and served as a reminder to the Adventist view of world history, starting with the vegetarian diet originating in the Garden of Eden (Sanchez et al. 2016).

One sociologist of religion has claimed that Adventists and other faiths with a vegetarian element, such as Buddhists, exhibit varying levels of a “bio-spirituality” in which “food, health and worship are unified on a daily basis, at every meal” (Nath 2010). In summary, though the SDA church does not include diet, including vegetarianism, as a formal element of theological teaching or as a tenet for membership, it does advocate for a healthy diet based on the principle that our bodies are temples of God.

The “Adventist” part of the denomination’s name refers to a belief in the literal return of Jesus, particularly as discussed in the Book of Revelation. A key passage is Revelation 12:6–12, which presents a vision of three angels who give a message to the world about the impending judgement and the importance of faithfulness and keeping the commandments. Early Church leaders advocated for the SDA Church fulfilling a prophetic role by proclaiming the “Three Angels Message”. Early on, Ellen White linked the “Health Message” with the “Three Angels Message”:

The health reform is as closely related to the third angel’s message as the arm to the body; but the arm cannot take the place of the body. The proclamation of the third angel’s message, the commandments of God and the testimony of Jesus, is the burden of our work. The message is to be proclaimed with a loud cry, and is to go to the whole world. The presentation of health principles must be united with this message, but must not in any case be independent of it, or in any way take the place of it. Page 75.1. (White 1976)

## 2.2. Church Structure

### 2.2.1. Membership and Church Institutions

As seen in Table 1, the SDA church had 20.3 million members worldwide as of 30 June 2017. For administrative purposes, the church is organized into 13 geographic ‘divisions.’ The headquarters for the worldwide church is called the General Conference and is located near Washington, D.C. Each division has its own administrative center, with many divisions being comprised of ‘conferences,’ which also have their own administrative structures. SDA membership is lowest in the Middle East and North Africa Division and Northern Asia-Pacific Division, primarily Islamic and Asian countries, particularly those presently or formerly under communist rule and/or where Christian evangelism is restricted.

**Table 1.** Selected Seventh-day Adventist resources as of 30 June 2017.

Administrative Region	Estimated Population	SDA Members	SDA Churches	Academy/High School	College/University	Hospitals/Sanitariums
Inter-American Division	302,456,000	3,782,922	13,784	156	13	12
East-Central Africa Division	393,340,000	3,650,375	15,319	26	6	9
Southern African-Indian Ocean Division	203,722,000	3,779,368	11,110	26	5	10
South American Division	340,556,000	2,502,153	13,324	223	13	17
Southern Asia Division	1,383,186,000	1,595,382	4521	72	8	10
Southern Asia-Pacific Division	1,029,370,000	1,442,678	7395	61	15	18
North American Division	362,581,000	1,243,316	5530	116	11	58
Northern Asia-Pacific Division	1,625,230,000	721,424	2195	14	6	11
West-Central Africa Division	423,512,000	746,467	4218	0	3	21
South Pacific Division	40,515,000	498,275	2114	40	4	2
Inter-European Division	338,127,000	178,670	2551	11	9	2
Euro-Asia Division	325,723,000	110,783	1791	0	2	0
Trans-European Division	205,396,000	87,363	1196	7	5	1
<i>Attached to the General Conference</i>						
Middle East and North African Union Mission	548,207,000	3983	53	1	1	0
Israel Field	8,348,000	700	11	0	0	0
Total:	7,535,176,000	20,343,814	85,112	753	101	172

Source: 2018 Seventh-day Adventist Yearbook, <http://www.adventistyearbook.org>.

The SDA church has emphasized evangelism efforts in developing countries. A majority of members reside in low to middle-level income countries, with the top five countries in 2009 being India—1.5 million, Brazil—1.1 million, the United States—1.0 million, Philippines and Zambia—0.7 million each (Lawson and Cragun 2012). Furthermore, even within developed countries, a large percentage of Adventists are in lower-income categories (Lawson and Cragun 2012).

Adventists were early adopters of medical programs on radio and cooking shows on television and have become media-savvy about spreading their health message. As of 31 December 2016, the SDA Church had 15 media centers, 59 publishing houses and branches, 6050 credentialed and licensed literature evangelists, and 25,332 full time/part time/intern literature evangelists who distribute books and other materials, including the vegetarian and health message in about 375 languages (SDA 2018). Furthermore, the Church programs aired on 853 radio stations and 441 television stations; produced more than 70,000 podcasts each year in 229 languages with over 1.1 billion downloads in 2015 (Sboros 2017). One example is the *It Is Written* ministry (<https://www1.itiswritten.com/>), which is currently based in Chattanooga, Tennessee. That ministry has been airing TV programs since 1956 and also has a related Spanish-language ministry. Although most of their effort is on evangelism and humanitarian projects, they have produced media segments specifically on diet.

The Adventist Church has a mission emphasizing health care and education. As seen in Table 1, as of 30 June 2017 the SDA Church had 85,112 local churches, 171 hospitals or sanitariums, 101 colleges or universities, and 753 secondary schools. At a practical level, co-location of SDA schools, hospitals, food factories and churches provides a synergy among Adventist institutions. For example, as a result of co-location, parent(s) may work for an SDA hospital or college and send their child(ren) to SDA K-12 schools. The entire family then attends a local SDA church. Additionally, there are often SDA grocery stores which specialize in the sale of vegetarian foods located on or near SDA colleges and/or church regional offices. This co-location reinforces the SDA lifestyle among members.

### 2.2.2. Adventist Healthcare

The Adventist “health system” is one of the largest nonprofit healthcare delivery systems in the world. In addition to hospitals and sanitariums, in 2016, the SDA Church operated 329 clinics and dispensaries, 133 nursing homes/retirement centers and 21 orphanages/children’s homes, and provided more than 17 million outpatient visits (SDA 2018). As a result, many people were potentially exposed to the Church’s wellness and lifestyle philosophy.

Although organizationally distinct, the hospital network is perceived to be under the umbrella of the SDA Church. That network in the United States includes five different systems which together have 83 hospitals (AHPA 2017). Roughly thirty independent hospitals throughout Africa, Asia, and the

Americas are loosely coordinated through Adventist Health International ([What Is AHI? 2018](#)), which is headquartered in Loma Linda.

An underlying premise of SDA health care is the importance of total wellness (spiritual, physical, social and mental). Unfortunately, the reputation of hospital food both inside and outside of Adventism has not always been the best. More Adventist hospitals are moving away from greasy, highly processed and bland tasting foods, making way for fresh, vibrant and tasty vegetarian fare using ingredients grown on on-site gardens or from local farmers. One example of this is the Parkview Adventist Medical Center in Brunswick, Maine ([Kamila 2010](#)). Another example is the Adventist Health Castle Medical Center in Kailua, Hawaii, which always includes a vegan option at each meal and highlights their renowned tofu walnut bars ([The Bistro 2018](#)). Many other hospitals also tout their food services on-line. The majority of Adventist Health institutions offer vegetarian food items in their cafeterias as well as to their patients, though many also offer limited meat options for their patients.

There is limited published research regarding Adventist hospitals, one resource being the Adventist HealthCare Center for Health Equity and Wellness located in Gaithersburg, Maryland (<https://www.adventisthealthcare.com/health/equity-and-wellness/research/>). Another resource is the Australasian Research Institute located on the campus of the Sydney Adventist Hospital (<http://www.australasianresearch.org/>). The Australasian Research Institute has published diet-related articles regarding inpatients. Another organization that could potentially address hospitals and diet is the Adventist Health Policy Association (<http://adventisthealthpolicy.org/>).

### 2.2.3. Sanitariums

Historically, the Seventh-day Adventist Church was linked with the health sanatoriums of the ‘Christian Physiology’ movement of nineteenth century America ([Nath 2010](#)). That health reform movement was underscored by beliefs that diet was not only essential in maintaining health but also pivotal in shaping morality ([Nath 2010](#)). On a practical level, Ellen White’s vision of health reform was first operationalized in 1866 as the Western Reform Institute in Battle Creek Michigan. It combined several theories of health reform designed to heal the whole person by caring for the mind, body and spirit. Patients were taught to cure themselves whenever possible using “natural” means, including water, sunshine, exercise, rest and proper diet. To bring a more professional approach, the White’s partially subsidized the medical education of John Harvey Kellogg, the son of initial contributors to the Institute. Dr. John Harvey Kellogg served as medical director for 67 years, renaming the institute as the “Battle Creek Medical Surgical Sanitarium” ([The Battle Creek Idea 2009](#)). Dr. John Harvey Kellogg emphasized hydrotherapy (more than 200 variety of water treatments), invented several forms of light and radiant heat baths—including one installed in Buckingham Palace, developed musical accompaniments for exercise routines, and performed over 22,000 operations—and was even consulted by the Mayo brothers and other leading physicians of the day on difficult cases ([The Battle Creek Idea 2009](#)).

Malcolm Bull argued that John Harvey Kellogg was crucial in the medicalization and secularization of the SDA church. For example, whereas Ellen White had originally supported lifestyle reform on moral grounds, such as to control sexual appetite and avoid sin; the church transitioned to health as an important goal in-and-of itself, with the religious organization generally following the lead taken by medicine ([Bull 1990](#)). A brief overview of sanitariums, with an emphasis on diet, was given in a speech by Dr. Kellogg:

The sanitarium is a product of modern medical progress . . . The central and fundamental idea in such a place should be the thought that health-getting is not a matter of magic nor of pill-swallowing, but, rather, a matter of education. . . . A sanitarium must provide food prepared in such a manner as to be both wholesome and palatable, tempting to the patient whose appetite is perverted and fickle, and at the same time easy of digestion and highly nourishing. ([Kellogg 1891](#))



The Battle Creek Sanitarium grew dramatically during its first forty years, including a large new construction following a fire in 1902. However, with increasing success there was also increasing conflict between church and Sanitarium leaders to the extent that in 1907 the Kellogg brothers assumed full control and were “dis-fellowshipped” from the SDA church ([The Battle Creek Idea 2009](#)). Eventually most sanitariums became traditional hospitals, even if keeping the designation in their name. However, there are some modern Adventist examples still following the historical precedents, such as the Weimar Institute in Northern California, which treats guests using the NEWSTART approach (N = Excellent Nutrition, E = Regular Exercise, W = Pure Water, S = Sunlight in Moderate Amounts, T = Temperance in All Things, A = Fresh Air, R = Daily and Weekly Rest, T = Trust in God ([About Us 2018](#))).

An essay specifically on Adventism in Nordic countries observed that the sanitarium concept of the early 1900’s found a ready market, particularly among the upper classes. However, as society became more secularized, as government increasingly paid for healthcare, and as SDA institutions provided conventional medical procedures, it became more difficult to maintain distinct SDA facilities ([Eklof 2008](#)). The conclusion, at least within Sweden, was that “The successful enterprises—as they had been for a considerable time—could not, at the end of the 20th century, continue to be self-financing or fulfil the missionary objectives among the upper classes. The institutionalized health care apparatus came to an end around the turn of the century, which also included the sale of health associated food product companies” ([Eklof 2008](#)).

#### 2.2.4. SDA Education

As of 31 December 2016 there were 8515 educational institutions in the world under SDA management, with total enrollment of 1.95 million students ([SDA 2018](#)), making it the world’s second largest integrated network of schools. As part of the admissions process, students are informed of the SDA lifestyle requirements while on campus. Adventist schools serve vegetarian meals to their students and promote an atmosphere of wholeness in which there is a balance between diet, exercise and school work. Schools are always working to ensure that the meals served are not only tasty and visually appealing but that they also meet the national nutritional guidelines. Many of those schools, particularly within the US, have webpages which mention their menus. An article published by the Vegetarian Resource Group highlights an effort by a dietitian to improve the quality of the vegetarian lunch menu in one SDA school ([Gall and Salazar 2012](#)).

Although the largest number of people are touched in primary and secondary schools, there is a strong emphasis on academic and professional training. Most salient for diet, particularly with the establishment of multiple Adventist sanitariums, was a need for trained dietetic staff. Early in the 1900’s the question was raised as to how the church would educate members to fill the need. “Are we to send our young people to worldly schools to study the science of health and nutrition and then apply their knowledge to the solving of the problems in our institutions” ([Denny 1919](#))? According to Ellen G. White, one answer was to provide education through its own schools rather than send members to secular schools:

At Loma Linda many can be educated to work as missionaries in the cause of health and temperance... That which is of the most importance is that the students be taught how to represent aright the principles of health reform. ([Denny 1919](#))

Thus, nutrition and dietetics education was established in 1908 at Loma Linda University. Furthermore, Mervyn G. Hardinge produced one of the early investigations of vegetarianism for a doctoral dissertation at Harvard in the early 1950’s, then went on to be founding dean of the Loma Linda University School of Public Health in 1967. As seen in [Table 2](#), 13 other SDA universities also offer college through graduate degree programs in diet/nutrition. In addition to the United States, nutrition degrees are offered in Jamaica, Mexico, Argentina, Peru, Brazil, Kenya, Nigeria, Zimbabwe, the Philippines, and South Korea.

**Table 2.** SDA higher education in nutrition and dietetics.

Location	University	Degree	Website
California, USA	Loma Linda University	PhD in Nutrition	<a href="https://publichealth.llu.edu/academics">https://publichealth.llu.edu/academics</a>
		MPH in Nutrition	<a href="https://publichealth.llu.edu/academics">https://publichealth.llu.edu/academics</a>
		BS and MS in Nutrition and Dietetics	<a href="https://alliedhealth.llu.edu/academics">https://alliedhealth.llu.edu/academics</a>
Michigan, USA	Andrews University	B.S. in Nutrition and Dietetics	<a href="https://www.andrews.edu/shp/publichealth/">https://www.andrews.edu/shp/publichealth/</a>
		MPH Nutrition and Wellness	
Alabama, USA	Oakwood University	A.S. in Dietetics	<a href="https://www2.oakwood.edu/">https://www2.oakwood.edu/</a>
Nairobi, Kenya	Adventist University of Africa	MPH with concentration in nutrition	<a href="https://www.aua.ac.ke/">https://www.aua.ac.ke/</a>
Ilisan-Remo, Nigeria	Babcock University	B Sc. (Hons) Nutrition and Dietetics	<a href="https://www.babcock.edu.ng/bu_sch_med.php">https://www.babcock.edu.ng/bu_sch_med.php</a>
Bulawayo, Zimbabwe	Solusi University	BSc Food and Nutrition	<a href="http://solusi.ac.zw/">http://solusi.ac.zw/</a>
Seoul, South Korea	Sahmyook University	BS Food and Nutrition	<a href="https://www.syu.ac.kr/web/eng/academics_a_03_03">https://www.syu.ac.kr/web/eng/academics_a_03_03</a>
Silang, Cavite, Philippines	Adventist University of the Philippines	BS in Nutrition and Dietetics	<a href="http://web1.aup.edu.ph/">http://web1.aup.edu.ph/</a>
Silang, Cavite, Philippines	Adventist International Institute of Advanced Studies	MPH emphasis in nutrition	<a href="https://www.aiias.edu/en/academics">https://www.aiias.edu/en/academics</a>
Kingston, Jamaica	Northern Caribbean University	BS in Dietetics	<a href="http://www.ncu.edu.jm/academic-programmes.html">http://www.ncu.edu.jm/academic-programmes.html</a>
Nuevo León, Mexico	University of Montemorelos	BS in Nutrition	<a href="http://www.um.edu.mx/">http://www.um.edu.mx/</a>
Entre Ríos, Argentina	Adventist University of the Plata	BS in Nutrition	<a href="http://www.uap.edu.ar/">http://www.uap.edu.ar/</a>
Lima, Peru	Peruvian Union University	MS in Vegetarian Nutrition BS Nutrition	<a href="http://www.upeu.edu.pe/fsalud/nutricion/">http://www.upeu.edu.pe/fsalud/nutricion/</a>
São Paulo, Brazil	Adventist University Centre of São Paulo	BS in Nutrition	<a href="http://www.unasp.br">http://www.unasp.br</a>

### 2.2.5. SDA Churches

There have been thousands of articles published regarding churches and health. These include efforts by the public health and academic communities to work with various churches to further health promotion activities and to reduce health disparities (Markens et al. 2002; Kaplan et al. 2006). Religious organizations can have a great influence on members' behavior at many levels (Campbell et al. 2007).

One way in which efforts at local churches are enhanced is through coordinating from within the SDA hierarchy. For example, the SDA General Conference has a health ministry's department, which supports and coordinates health activities throughout the organization. As an example of the ongoing importance of diet, their main webpage on 11 July 2018 included a number of diet-related items, such as a report on the most recent General Conference Nutrition Council Annual Meeting, a summary of the 7th International Congress on Vegetarian Nutrition, a Factsheet on vegetarian diets and a link to the SDA vegetarian version of the USDA MyPlate (<http://healthministries.com/>).

SDA churches provide a number of food-related activities not just for their members but also for the community in the form of food drives and vegetarian cooking classes. Churches may serve as venues for public health interventions. An SDA version is the Complete Health Improvement Program (CHIP), developed by Loma Linda University graduate Hans Diehl, which is centered on the

promotion of a whole-food, vegetarian eating pattern, and daily physical activity (Morton et al. 2014; Diehl 1998).

Furthermore, the link between nutrition education and church mission is clearly shown in an *Adventist Review* (a denominational newsmagazine) article:

In the Far East, Africa, the Middle East, North, Central, and South America, Europe, Australia, and the islands of the Pacific, Vegetarian Nutrition instructors are directing schools of health, cooking schools, and helpful classes of many kinds. With new programs for the home, the church, and the community, the church is acknowledging the truth of Ellen G. White's statement: "To teach . . . the science of healthful living is to do missionary work for the Master."—*Counsels on Diet and Foods*, p. 476. (Vyhmeister 1984)

One of the SDA traditions is the "Sabbath Potluck" where church members bring a vegetarian dish to share and fellowship with other church goers. Whereas most SDA churches have an unwritten "vegetarian potluck" policy, there are churches where meat options will be found on the table. A recent article published in the *Adventist Review* discussed the passing of Ella May Hartlein (Ella May Hartlein, Credited with the Invention of the Haystack, Dies at 98 2018). She has been credited with the invention of Haystacks, which is one of the most popular "dishes" for SDAs. A mix of tortilla chips, beans, cheese and vegetables, it is a well-known menu item at camp meetings and other large church gatherings. There are many variations on the original recipe; for example, some add rice to the mix and skip the chips or some will have lettuce instead of chips.

#### 2.2.6. SDA Humanitarian Outreach

Adventist Development and Relief Agency (ADRA) is the global humanitarian organization of the Seventh-day Adventist Church (<https://adra.org/>). They deliver relief and development assistance to individuals in more than 131 countries, funding nearly 1200 projects and reaching an estimated 15.6 million beneficiaries (SDA 2018). ADRA focuses on nine impact areas, with one being hunger and nutrition. Efforts under this impact area include assisting farmers to increase their food supply, income and savings for food purchasing, helping women to identify, prevent, and treat malnutrition at an early stage, before it impacts their long-term health, and promoting community-level nutrition awareness using strategies that help households achieve diverse and nutrient-rich diets.

Indeed, when thinking of diet in less-developed parts of the world, such as much of Africa, the issue is not so much vegetarianism, as it is poverty and malnutrition, compounded by the epidemic of HIV/AIDS. In fact, it has been documented that one of the barriers to successful treatment of HIV/AIDS is food insecurity (McKinney et al. 2014). In an effort towards increasing the use of soybeans within Kenya, a household survey in 2005 found that essentially Adventists were the only respondents using soybeans; they were processing soybeans into roasted soy nuts or soy beverages (Chianu et al. 2008). Though not an official program, efforts directed toward an SDA response to poverty might follow a theology of wealth and poverty presented as a, "Charity in community with claiming faith and self-limitation" model in a paper based on in-depth interviews of Adventists in Malawi (Doss 2011). In that article, Gordon Doss noted that in 2010, 22% of all Christians resided in Africa and that those individuals often have different views regarding wealth and poverty compared to those in the West. Their views regarding acknowledgement of limited resources may be consistent with a plant-based, rather than meat-based diet.

### 3. SDA Food Industry, Research, and policy

#### 3.1. Food Industry

A centerpiece of the sanitarium philosophy was improving the diet of patients. Towards that end, Ella Eaton Kellogg, along with her husband John Harvey Kellogg and brother-in-law William Keith Kellogg, ran an experimental kitchen which developed more than 80 grain and nut-food products,



including peanut butter and flaked breakfast foods ([The Battle Creek Idea 2009](#)). In the United States, Seventh-day Adventists established around 100 cereal-based processed food companies, many of which merged ([Sboros 2017](#)). The Battle Creek Sanitarium played a significant role in shaping the mass-produced breakfast cereal industry ([Nath 2010](#)). The eating habits of the American public were transformed by flaking wheat, breakfast became boxed cereal a la Kellogg, as opposed to a breakfast heavy on eggs and meat.

[Shurtleff and Aoyagi \(2014\)](#), have released a 1344 page book in which they present historical details regarding Seventh-day Adventist work with soy foods, vegetarianism, meat alternatives, wheat gluten, dietary fiber and peanut butter. The following section relies heavily on their work. As they note, there are two basic types of Seventh-day Adventist organizations: (1) Those owned by the SDA church/denomination (officially General Conference of Seventh-day Adventists)—such as Sanitarium Foods (Australia) and Loma Linda Foods (from 1905 to about 1989) and (2) Those owned by practicing Seventh-day Adventists—such as Worthington Foods and Cedar Lake. There have been many transfers of ownership among food producers. This paper will not attempt to provide a complete corporate history or cover every food product. There have been many changes of ownership, including selling entities to non-Adventists. Furthermore, the emphasis for this review is on U.S. activities. As of 2016, the SDA Church reported owning 20 entities within the category of “Food Industries” ([SDA 2018](#)).

### 3.1.1. Breakfast Cereals

The wheat flake was discovered accidentally in 1894 and served in the Sanitarium dining rooms under the name of “Granose,” flavored only with salt. In 1895, Dr. Kellogg filed a patent application for “flaked cereals and the process of preparing same,” also including barley, oats, corn and other grains in the application. John and W. K. Kellogg formed the Sanitas Food Company primarily to manufacture their health foods for current and former patients ([The Battle Creek Idea 2009](#)).

A former patient, C.W. Post, developed Postum, a grain-based improved version of the coffee-substitute served at the Sanitarium, and then developed Grape-Nuts cereal, which turned Post into a millionaire by 1900. As others saw the potential wealth, a ‘cereal boom’ started in Battle Creek. Younger brother W.K. Kellogg wanted to join that broader market with products tastier than served at the Sanitarium, so he formed his own Battle Creek Toasted Corn Flake Company in 1906 ([The Battle Creek Idea 2009](#)), independent of his older brother who had little interest in profit. The resulting Kellogg Company is still based in Battle Creek, with a market capitalization in June 2018 of \$23.4 billion, whereas Post Holdings enjoys a market capitalization of \$5.9 billion.

### 3.1.2. Meat Analogues

Meat analogues are products developed with similar texture, flavor, color, and nutritive value to be substituted directly for meat. They can be created using low cost vegetable protein such as textured soy protein, mushroom, wheat gluten, and pulses as a substitute for animal-protein ([Kumar et al. 2017](#)). One randomized cross-over study of 43 healthy young men found that high protein meals based on beans and peas were more filling and satiating compared to a high protein meal based on veal and pork ([Kristensen et al. 2016](#)). Market research in 2012 found that although only 7 percent of consumers call themselves vegetarian, 36 percent report using meat substitutes ([Connolly 2013](#)).

This category of commercial meat alternatives was invented by Dr. John Harvey Kellogg, with his first two meat alternatives being Nuttose (1896) and Protose (1899)—both based on ground peanuts. In the United States this category was commercially pioneered (starting in the early 1940s) and developed by Worthington Foods and Loma Linda Foods ([Shurtleff and Aoyagi 2014](#)).

### 3.1.3. Soy Foods

In 1892, Ella Kellogg published “Science in the Kitchen”, in which she wrote, “The nitrogenous matter of legumes is termed *legumin*, or vegetable casein, and its resemblance to the animal casein of

milk is very marked. The Chinese make use of this fact, and manufacture cheese [clearly tofu] from peas and beans." This was followed by an 1896 editorial "Bean Cheese," by Dr. John Harvey Kellogg in his periodical *Modern Medicine and Bacteriological Review*, in which he gave a detailed description of how tofu and frozen tofu are made (Shurtleff and Aoyagi 2014). Later, Dr. Kellogg included two recipes involving soybeans in his 1919 edition of "The New Method in Diabetes" (Shurtleff and Aoyagi 2004).

La Sierra Industries (Arlington, California) launched La Sierra Smoein—a bacon-flavored smoked soy powder seasoning in 1921. This was America's first commercial soy-based meat alternative. Dr. Harry W. Miller started making and canning Miller's Soya Lac (soymilk fortified with vitamins and minerals, renamed Soyolac by September 1941) and Soy-A-Malt (malted soymilk) at his International Nutrition Laboratory in Mt. Vernon, Ohio. Soyolac was America's first widely successful soymilk. It remained on the market as an infant formula for decades (Shurtleff and Aoyagi 2014).

In 1960, Worthington Foods, originally of Worthington, Ohio introduced Fry-Chik, a meatless drumstick that was the world's first meat alternative based on spun soy protein fibers, followed in 1974 with the Morningstar Farms line of meat-like products also based on spun soy protein fibers. The first of a new generation of meat alternative entrees, they were soon sold nationally in U.S. supermarkets. Since the mid-1970s, Worthington has been the world's largest manufacturer of meat-like vegetarian products—most based on soy proteins and gluten. However, Kellogg Co. purchased Worthington Foods in 1991 for \$342 million. With that sale, there was a time with no SDA companies making soy foods or meat alternatives in the United States (Shurtleff and Aoyagi 2014).

However, in 2009, Adventists formed Heritage Health Foods (<http://heritagehealthfood.com/>), located in Collegedale, Tennessee. Heritage purchased both the Cedar Lake Food Company (originally of Cedar Lake, Michigan) and the Worthington frozen product line. They sell not only soy products, but also vegetarian corn dogs, sliced deli meats, hamburgers, sausage, and even vegfish fillets.

Outside of the United States, there was SDA food production in England by 1907, with their first soy product, Granose Protose, being launched in 1940 (Shurtleff and Aoyagi 2014). Although no longer under SDA control, granose continues to be sold by Symington's, an English company founded in 1827. Harry W. Miller, an Adventist medical missionary in China, in 1937 introduced Vetose Soya Milk (natural or chocolate), Soy Ice Cream, and Vetose Acidophilus (cultured soymilk) made by his Vetose Nutritional Laboratories in Shanghai; unfortunately, that business was destroyed by the Japanese military during World War II. Fortunately, he survived and moved to Ohio (see above). On a more successful international note, in 1962 Dr. Harrison, a Black American physician and self-supporting Seventh-day Adventist medical missionary, founded Africa Basic Foods in Uganda. This was the earliest known company in Black Africa to make and market a line of commercial soy foods. His company continues as the East African Basic Foods Ltd.

#### 3.1.4. Wheat Gluten

As early as 1882, the Food Department of the Battle Creek Sanitarium was selling Gluten Wafers, Gluten Food, and Diabetic Food. All were probably used in diabetic diets. In 1907, Dr. Kellogg was issued U.S. Patent 869,371 for a meat substitute whose two main ingredients were gluten and casein (milk protein). By 1912 the Kellogg Food Co. in Battle Creek, Michigan, was selling at least 7 food products based on wheat gluten, including 3 types of biscuits and a breakfast toast. Protose, launched in 1899, was Dr. Kellogg's second earliest commercial meat like product—after Nuttose. Originally made from nuts, at some early unknown date Protose came to include gluten.

Worthington Foods has been the most commercially successful in introducing gluten-based meat like products to America. Their first such product was Proast, launched in 1939, followed by Choplets in 1941. In 1968–70 with Prosage (a meatless sausage) Worthington invented a unique and proprietary process for combining gluten and textured soy proteins to give improved texture, flavor, and nutritional value—leading to a host of new meat like products by the early 1980s. By 1992, Seventh-day Adventist food companies had introduced at least 166 commercial food products containing gluten as a major

ingredient; of these, at least 55 were made by Worthington Foods. Moreover, of Worthington's 180 products, approximately 90% contained at least some wheat gluten (Shurtleff and Aoyagi 2014).

### 3.1.5. Peanut Butter

According to legend, a kitchen worker stepped on a peanut and from that concocted America's favorite sandwich spread. Dr. John Harvey Kellogg, in an 1895 letter to Ellen G. White in Australia, wrote: "We make very little use of cream or milk in our family, and use no butter whatever for seasoning, but use nuts instead. I have recently succeeded in making some very excellent preparations from nuts which take the place of butter entirely and are sweeter, more palatable, and more digestible. I find this plan is working very successfully both with the patients and with the helpers at the Dormitory." Three months later, Dr. Kellogg applied for U.S. patent (No. 567,901) for a "nut-butter" made from peanuts or almonds (Shurtleff and Aoyagi 2014).

In 1896 Dr. Kellogg's peanut butter was sold commercially, by Sanitas Nut Food Company. In an ad titled "New Nut Products" in the *Chicago Vegetarian* (p. 8), Nut Butter was advertised as: "A substitute for ordinary butter, presenting fat in the form of a perfect emulsion; combined with water, forms a delicious cream. Used for shortening of all kinds. A pure product of nuts; can be eaten by those who cannot eat ordinary butter (Shurtleff and Aoyagi 2014)." Then, in 1898, Edward Halsey, formerly a baker at Battle Creek, through the Sanitarium Health Food Co. in Australia introduced Sanitarium Peanut Butter—Australia's first (Shurtleff and Aoyagi 2014).

### 3.1.6. SDA-Operated Food Organizations

Table 3 presents the food industries which are officially part of the Seventh-day Adventist Church. The oldest of organizations, listed in the SDA Yearbook under the name of "Health Food Department", is the Sanitarium Health and Wellbeing Company, which is the trading name of two sister food companies (Australian Health and Nutrition Association Ltd. and New Zealand Health Association Ltd.). Founded in Melbourne, Victoria, Sanitarium has factories in Australia and New Zealand. Its flagship product is Weet-Bix, sold in the Australian and New Zealand breakfast cereal markets. Sanitarium has produced and marketed many food products throughout its 120 year history, including breakfast cereals, peanut butter, vegetarian meals, snacks and beverages (Sanitarium—Our Story 2018). It is considered to be the largest and most diverse organization within the Adventist food industry.

**Table 3.** Seventh-day Adventist food industries as of 30 June 2017.

Name	Year Established	Location	Web Page
<b>South Pacific Division</b> Health Food Department	1898	Wahroonga, Australia	—
<b>Inter-European Division</b> Bioherba Health Food Company	1899; reorganized 2008	Heimertingen; Germany	<a href="http://www.bergland.de">www.bergland.de</a>
<b>South American Division</b>			
Argentina Food Factory	1938	Buenos Aires; Argentina	<a href="http://www.granix.com.ar">www.granix.com.ar</a>
Baradero Plant	1984	Buenos Aires; Argentina	—
Campana Plant	2011	Buenos Aires; Argentina	—
Argentina Restaurant	1981	Buenos Aires; Argentina	—
Brazil Food Factory	1936; reorganized 1984	Sao Paulo, Brazil	<a href="http://www.superbom.com.br">www.superbom.com.br</a>
Lebon Regis Plant	—	Lebon Regis, Brazil	<a href="http://www.superbom.com.br">www.superbom.com.br</a>
Sao Paulo Plant	—	Sao Paulo, Brazil	<a href="http://www.superbom.com.br">www.superbom.com.br</a>
Ecuador Food Factory	2016, independently	Santo Domingo de los Tsachilas, Ecuador	<a href="http://www.alimentoscade.com">www.alimentoscade.com</a>
<b>Northern Asia-Pacific Division</b>			
Korean Sahmyook Food	1978	Choongnam, Korea	<a href="http://www.sahmyook.co.kr">www.sahmyook.co.kr</a>
Korean Sahmyook Food Bonghwa Factory	1994	Kyungbuk, Korea	—
Korean Sahmyook Food Unju Factory	1994	Jeonbuk, Korea	<a href="http://www.sahmyook.co.kr">www.sahmyook.co.kr</a>
San-Iku Food Company	1987	Chiba, Japan	<a href="http://www.san-iku.co.jp">www.san-iku.co.jp</a>
San-Iku Foods	1970	Chiba, Japan	<a href="http://www.san-iku.co.jp">www.san-iku.co.jp</a>
San-iku Vegetus Company	1998	Chiba, Japan	<a href="http://www.vegetus.jp">www.vegetus.jp</a>

Table 3. Cont.

Name	Year Established	Location	Web Page
<b>Inter-American Division</b>			
Inter-American Health Food Company	1977	Miami, Florida	<a href="http://www.interamerica.org">www.interamerica.org</a>
Alimentos Colpac—Mexico	1969	Sonora, Mexico	<a href="http://www.colpac.com.mx">www.colpac.com.mx</a>
Caribbean Health Foods Limited—Trinidad	1987	Port of Spain, Trinidad; Trinidad and Tobago	<a href="http://caribbeanhealthfoods.com">caribbeanhealthfoods.com</a>
Cetebedi, S.A.—Costa Rica	1967	Alajuela, Costa Rica	<a href="http://www.soyapac.com">www.soyapac.com</a>
Colombia Branches (Productos Icolpan)	1972	Medellin; Colombia	<a href="http://www.icolpan.com">www.icolpan.com</a>
Industrias Venepan—Venezuela	1998	Yaracuy; Venezuela	<a href="http://www.venepan.com">www.venepan.com</a>
Productos Granix—Dominican Republic	—	Bonao; Dominican Republic	—
Viva Mejor—Barquisimeto	—	Edo. Lara; Venezuela	—
Viva Mejor—Bogota	2014	Bogota; Colombia	<a href="mailto:administracion@vivamejorbogota.com">administracion@ vivamejorbogota.com</a>
<b>Middle East and North Africa Union Mission</b>			
Adventist Health Education Foundation	1976	Cairo, Egypt	—

Source: 2018 Seventh-day Adventist Yearbook (pp. 579–582), <http://www.adventistyearbook.org>.

### 3.2. Research

There is now a well-established body of research by Adventists which support a vegetarian lifestyle. However, it is important to recognize that there was some risk involved at the beginning. In fact, administrators at Loma Linda University in the mid 1900's discouraged the first vegetarian researcher, because, "if you find the diets of vegetarians are deficient, it will embarrass us" (Johnston 1999). Fortunately, that researcher, Mervyn G. Hardinge, persevered and encouraged others as well. It is also important to note that there are many conflicting claims made regarding which type of diet is optimal. This paper is not the forum for such a scientific debate, in this section we are simply presenting what Adventists have published in the peer-reviewed literature.

#### 3.2.1. Adventist Health Studies

The Adventist Health Studies and several British studies, most recently the Oxford EPIC Study, have been recognized as major Western cohort studies that generally demonstrate vegetarian diet health benefits, such as reduced cardiovascular disease, cancer, and overall mortality rates as well as better mental health (Beezhold et al. 2009; Key et al. 1999; Tonstad et al. 2009). The results from the British studies with regard to cancer and total mortality have been less convincing, although showing somewhat similar results. It is well-recognized, however, that vegetarian diets in different parts of the world do differ substantially (Fraser 2009), which makes direct comparisons challenging.

The Adventist studies began with the SDA Mortality Study of 1958–1966 (Kahn et al. 1984; Phillips 1980). White male and female California Adventists who were 30 to 89 years old in 1960 were recruited from 234 churches, and participants completed a self-administered questionnaire in 1960 (Snowdon and Phillips 1985). There were 22,940 study participants (Butler et al. 2008). In addition to surveys, all deaths in the Adventist cohort during 1960 to 1980 were identified by computer-assisted record linkage to the California death certificate file (Snowdon and Phillips 1985).

Next was the First Adventist Health Study of 1974–1988 (Fraser et al. 1991; Fraser et al. 1992; Singh and Fraser 1998). This cohort was defined as non-Hispanic White subjects 30 years of age and older who lived in California Adventist households and completed two mailed demographic and lifestyle questionnaires (Fraser and Shavlik 2001). Participants were initially contacted from names and addresses in church directories and sent a brief census questionnaire. The study enrolled 34,192 men and women from 437 churches who were sent and returned extensive lifestyle questionnaires, supplemented by hospitalization data and matches against state death tapes and the National Death Index (Fraser and Shavlik 2001).

The Adventist Health Study 2 (AHS-2) began in 2002, with goals of examining the relationship between diet and risk of breast, prostate, and colon cancers in Black and White individuals. A total of 96,194 Adventists in 4500 churches from the United States and Canada were recruited. Special emphasis was placed on recruiting Blacks, who comprised a substantial portion of Church membership,

with AHS-2 staff and trained local recruiters soliciting participation from members of approximately 1000 Black churches throughout the United States and Canada (Herring et al. 2010). It was observed that calling those members from churches who had not returned the initial questionnaire within three months did increase participation from Black churches; but not White churches (Bell et al. 2005). Blacks comprised 26.9% of the final sample (Butler et al. 2008). Both AHS-1 and AHS-2 examined incidence and mortality, and across all three studies, no more than 2.1% of males and 1.1% of females were current smokers (Butler et al. 2008).

AHS-2 has received more than \$24 million in National Institutes of Health funding since 2002 and resulted in more than 110 publications as of early 2018. Approximately 400 peer-reviewed publications have come from all Adventist studies over the 50+ year span. Findings have been published in prestigious journals such as *JAMA* (Smith-Warner et al. 2001), *The New England Journal of Medicine* (Sabate et al. 1993), *Archives of Internal Medicine* (Fraser et al. 1992; Fraser and Shavlik 1997), and *JAMA Internal Medicine* (Fraser and Shavlik 2001; Orlich et al. 2013). According to Google Scholar, as of July 2018, some articles have been cited more than 400 times, with topics including the health effects of nut consumption (Fraser et al. 1992; Sabate et al. 1993), diet and prostate cancer (Mills et al. 1989; Jacobsen et al. 1998), effects of air pollution (Abbey et al. 1991; Abbey et al. 1999), diet and type 2 diabetes (Tonstad et al. 2009), and general effects of diet on cancer/heart disease/mortality (Mills et al. 1989; Fraser 1999; Phillips 1975; Van den Brandt et al. 2000).

Given the large number of papers, it is beyond the scope of this paper to extensively review all findings. Dr. Gary Fraser, the principal investigator for AHS-2, has written a book summarizing findings from Adventist Health studies in relation to chronic illness, particularly cancer and heart disease (Fraser 2003). More recent reviews have quantitatively summarized Adventist Health Studies findings with regards to intermediary health outcomes such as obesity, hypertension, and diabetes (Le and Sabate 2014; Orlich and Fraser 2014), as well as ischemic and other cardiovascular diseases and specific types of cancer (Le and Sabate 2014). For the present review, Dr. Fraser has briefly summarized below several of the most noteworthy aspects in the Adventist Health Studies series:

- The studies describe mortality and experience of major non-communicable disease among Adventists.
- Adventists have lower overall mortality, incidence of cardiovascular disease, and also many cancers.
- Among Adventists, different vegetarian categories (vegans, lacto-ovo-, pesco-vegetarians) are defined and their dietary characteristics described.
- Vegetarian Adventists have less hypertension, lower blood lipids and C-reactive protein (CRP—associated with inflammation), less diabetes, and lower body mass index (BMI) values, when compared to Adventist non-vegetarians.
- Vegetarian Adventists have less cardiovascular disease, lower rates of colorectal cancer, and vegans especially have lower rates of prostate, and probably breast cancer, than non-vegetarian Adventists.
- Adventists in California live 7.3 years (men) and 4.4 years (women) longer than non-Adventist California men and women, adjusting for educational differences.
- Red meat eaters have higher rates of colon cancer.
- Higher nut consumption is associated with much lower risk of coronary heart disease.
- Those drinking more dairy milk have lower rates of colon and rectal cancers (but preliminary findings suggest increased risk of breast and prostate cancers).
- Independent of fats in the diet, proteins from red meat are associated with higher, and proteins from nuts and seeds with lower, risk of cardiovascular mortality.
- A good breakfast and avoiding calories later in the day are associated with lower body weight with aging.
- Adventists tend to move toward more vegetarian diets as they age.
- Higher tomato consumption is associated with lower rates of prostate and ovarian cancers.
- Confirmed the apparent helpful effects of regular physical activity and adequate protein intake to prevent common bone fractures.



- Found that overweight is associated with increased mortality through to old age.
- Air pollution is associated with an increased risk of lung cancer, cardiovascular disease, asthma and total mortality.

Adventist Health Studies have required developing methods of dealing with effects of dietary reporting errors and also tested innovations to recruit Black study members more effectively. It should be noted that AHS also demonstrated the health benefits of church attendance. For example, findings from AHS-1 suggested that even after controlling for previous disease status, gender, vegetarian diet, exercise, nut consumption and smoking, Adventists who attended church less than once per month were 1.58 times more likely to die during the study period than those who attend church 3 to 4 times per month (Fraser 2003).

### 3.2.2. Biopsychosocial Religion and Health Study (BRHS)

In many respects, it is difficult to study the effects of religion and diet on mortality because AHS-2, by and large, is a church-going cohort, with few members using tobacco or drinking alcohol; moreover, the non-vegetarians eat less red meat compared to the average American. Loma Linda researchers, nevertheless, took on this challenge with funding from the National Institute of Aging for what became the Biopsychological Religion and Health Study (BHRS). The goal was to select a sample from the AHS-2 cohort and obtain additional psychological and religious data (the Psychosocial Manifestations of Religion Sub-study, PsyMRS) and additional biological measures for an even smaller subset (the Biological Manifestations of Religion Sub-study, BioMRS) (Lee et al. 2009)—at two points in time four years apart.

In an examination of how various psychosocial and religious measures affect mortality, BRHS researchers sampled approximately 21,000 AHS-2 members, of which 10,988 agreed to complete a 20-page questionnaire. Of these, 6531 also submitted completed surveys four years later (Morton et al. 2017). The authors concluded that there are, “complex, interrelated set of religious constructs that mutually reinforce and complement one another, with the links between religious variables with psychosocial mediators leading to healthier behaviors and decreased mortality” (Morton et al. 2017). Interestingly, they found that religious involvement itself had more of an influence than social support in reducing negative emotional experience.

Whereas lifestyle factors such as vegetarian diet and regular exercise were important predictors of reduced rates of hypertension, even after controlling for these, intrinsic religiosity was just as strongly related to lower hypertension rates as the lifestyle factors (Charlemagne-Badal and Lee 2016). The favorable relationships between anticipated church support and hypertension appear to be mediated by BMI and are an indication of how this dimension of religion combined with lifestyle promotes good health, specifically, reduced risk of hypertension (Charlemagne-Badal and Lee 2016b). In addition, BHRS data has been used to show that trans fatty acid intake and Mediterranean (mainly vegetarian) foods were related to more positive and less negative affect (Ford et al. 2016; Ford et al. 2013) as well as related to better emotion regulation (Holt et al. 2014, 2015).

### 3.2.3. Vegetarianism and Environment

Concern for nature is one of the reasons that convinces many to pursue a plant-based diet. This includes both a desire to avoid taking the life of animals and a desire to reduce the impact on the environment. LLU researchers used findings from the Adventist Health Study to estimate what the impact would be in California if everyone consumed a vegetarian diet. Researchers concluded that the non-vegetarian diet required “2.9 times more water, 2.5 times more primary energy, 13 times more fertilizer, and 1.4 times more pesticides than did the vegetarian diet (Marlow et al. 2009).”

LLU researchers have argued that a meat-based diet is harmful to the environment (Sabate et al. 2015), a vegetarian diet could be beneficial regarding climate change (Soret et al. 2014), and that wider use of a vegetarian diet not only benefits the environment, it would also advance social justice (Sabate and Soret 2014).

### 3.2.4. Research Activity outside of the United States

California is not the only source of Adventist studies. There have been diet and lifestyle-related studies regarding Adventists in a number of countries. As shown in Table 4, these studies have further documented actual dietary patterns of Adventists and have generally shown better health outcomes among Adventists, though in some cases showing a shortfall of nutrients or calories. Most studies involving Adventists other than the Adventist Health Studies series have been descriptive or involved small sample sizes, one exception has been the use of population registries in Nordic countries. For example, in Denmark researchers were able to identify thousands of Adventists and Baptists based on church records and national datasets, then prospectively match to hospital and death records (Thygesen et al. 2012b).

**Table 4.** Selected SDA diet-related research conducted outside of United States.

Country	Summary of Findings	References
Australia	The Adventist Minister's Health Study (survey and clinical data from 340 ministers) found that a majority of lacto-ovo vegetarians and vegans not taking supplements had low levels of vitamin B-12.	(Hokin and Butler 1999)
Brazil	Survey and blood pressure measurement of 264 Adventists in Brazil found Adventists had lower hypertension compared to other Brazilian studies, those in Sao Paulo had lowest blood pressure.	(Silva et al. 2012)
Denmark	Following 11,580 Adventists and Baptists using national cancer registry, the Danish Religious Societies Health Study found that Adventists had lower cancer incidence compared to Baptists and the general population.	(Christiansen et al. 2015; Jensen 1983; Thygesen et al. 2012)
Finland	Examination of lacto-ovo-vegetarian diet on dental health measures, such as erosions and salivary composition. Low sugar diet associated with fewer dental caries.	(Linkosalo 1988)
Jamaica	A survey of 890 women found that Adventists in rural Jamaica had lower BMI compared to other Protestants.	(Bryan et al. 2012)
New Zealand	Survey data from 141 Adventists and clinical measures on a sample of 47 found that both non-vegetarian and vegetarian Seventh-day Adventists had better health measures than the average New Zealander and satisfactory iron and vitamin B12 status.	(Harman and Parnell 1998; McAnulty and Scragg 1996)
Nigeria	Chemical analysis of meals served at Babcock University for 210 students. Only females met 100% of recommended protein intake. Meal skipping was main contributor to inadequate macronutrient consumption.	(Ngozi et al. 2017)
Norway	Survey and clinical measures from the Norwegian Cardiovascular Disease Studies and Tromsø Heart Study found that Adventists following the recommended lifestyle had lower coronary risk factors compared to non-compliant and former Adventists.	(Fonnebo 1985; Fonnebo and Helseth 1991; Fonnebo 1992a, 1992b)
Poland	A. Follow-up on 236 Adventists found greater life expectancy compared to the general population. B. Survey of males in the Warsaw assembly found they closely followed the national recommended healthy diet guidelines.	(Jedrychowski et al. 1985; Słociak and Bartnikowska 2008).

## 3.3. Policy

### 3.3.1. Dietetics Associations

In addition to educating professionals who were well versed in a vegetarian diet, Adventists have been involved with professional organizations. The American Dietetic Association was founded in 1917. One of its co-founder was Lenna Francis Cooper, the first lead dietitian at the Battle Creek Sanitarium. One way Cooper's influence was institutionalized was through an annual "Lenna Frances

Cooper Memorial Lecture” for the ADA. The 20th such lecture argued that nutrition is becoming an important element of medical education (Young 1983). Kathleen Zolber, PhD, a nutrition professor at Loma Linda University, became the first Adventist president of the ADA in 1982–1983. She was instrumental in establishing the Evidence Analysis Library, a source for sound information for RDs, and the publication of *Food For All*, authored by Lydia Sonnenberg, MS, RD and U.D. Register, PhD, RD. This publication led the way in acceptance of vegetarian diets by nutrition professionals

The ADA did not always advocate for a vegetarian diet. In fact, Loma Linda University’s dietetics program was not accredited until 1957, in part due to a belief that one could not be a real dietitian if not able to prepare a typical meat-based American diet. However, in 1988 the ADA issued a position statement favoring vegetarian diets, and have reaffirmed that position every four or five years since then, usually expanding the length of the position each time. The most current statement reads:

It is the position of the Academy of Nutrition and Dietetics that appropriately planned vegetarian, including vegan, diets are healthful, nutritionally adequate, and may provide health benefits for the prevention and treatment of certain diseases. These diets are appropriate for all stages of the life cycle, including pregnancy, lactation, infancy, childhood, adolescence, older adulthood, and for athletes. Plant-based diets are more environmentally sustainable than diets rich in animal products because they use fewer natural resources and are associated with much less environmental damage. Vegetarians and vegans are at reduced risk of certain health conditions, including ischemic heart disease, type 2 diabetes, hypertension, certain types of cancer, and obesity. Low intake of saturated fat and high intakes of vegetables, fruits, whole grains, legumes, soy products, nuts, and seeds (all rich in fiber and phytochemicals) are characteristics of vegetarian and vegan diets that produce lower total and low-density lipoprotein cholesterol levels and better serum glucose control. These factors contribute to reduction of chronic disease. Vegans need reliable sources of vitamin B-12, such as fortified foods or supplements. (Melina et al. 2016)

Of the nine authors and reviewers of the ADA’s 1988 vegetarian position paper, five were Adventist vegetarians and six took part in Loma Linda University’s First International Congress on Vegetarian Nutrition in 1987 ([History of the American Dietetic Association’s Vegetarian Position Papers, Part Three: 1988](#)). It was observed that at the First Congress nobody disputed that Seventh-day Adventists have longer life expectancies than the general population, probably due to vegetarianism and perhaps other elements of Adventist lifestyle ([History of the American Dietetic Association’s Vegetarian Position Papers, Part Three: 1988](#)). Furthermore, for the 2016 ADA position paper on vegetarian diet two of the four authors and reviewers were Adventist.

Early in 1954, SDA dietitians organized the Seventh-day Adventist Dietetics Association (SDADA). One of the membership requirements for SDADA was membership in ADA. In the first three years, they published many educational materials including pamphlets, manuals, recruitment slides and scripts, posters, articles in denomination periodicals, and their own journal, the “Dietitian’s Digest.” Paul Damazo, RD led in the production of the first ever color motion picture (30 min) on ADA dietetics as a career, “Service of Love,” which had a major positive influence on the dietetic profession in favor of SDA dietitians ([History of the American Dietetic Association’s Vegetarian Position Papers, Part One: Why Seventh-Day Adventists Want to Prove That Vegetarianism Is the Healthiest Diet, and How They Influenced the Ada/Academy of Nutrition and Dietetics 2012](#)).

The SDADA has 40 publications in English and 252 library holdings, in the genres of handbooks and manuals and popular works ([Seventh-Day Adventist Dietetic Association 2010](#)). Most of the works are diet manuals and cookbooks. Examples include “*Everyday Nutrition for Your Family*” in 1961, edited by Lydia Sonnenberg, a nutrition professor at LLU, the “SDADA Diet Manual”, and “It’s Your World of Good Food” (vegetarian cookbook) in 1973. That cookbook was written by U. D. Register and his wife, Helen Register, RD as an accompaniment to the national 30-min television program of the same name, starring Art Linkletter. Finally, the book “About Nutrition” had 5 editions published between 1971 and 1986.

### 3.3.2. International Vegetarian Congress

The First International Congress on Vegetarian Nutrition took place in 1987 in Washington, D.C. Lead organizers were nutrition and dietetics faculty at Loma Linda University, with support from the Loma Linda University Medical Center, affiliated groups, and the food industry, such as Worthington Foods. Subsequent meetings took place every five years, with the seventh taking place in Loma Linda on February 2018. These congresses have played a leading role in changing the attitudes of health care professionals (e.g., physicians, nutritionists, and dietitians) toward a vegetarian diet. The Seventh Congress included more than 750 attendees from 36 countries, including presenters from Harvard and Oxford (the EPIC study) Universities. Sponsors for the Seventh Congress included The Harding-Buller Foundation of Worthington, the Loma Linda Brand (producing plant-based proteins for more than 125 years), and Heritage Health Food/Worthington. Proceedings for the first six conferences have been published as supplements to the *American Journal of Clinical Nutrition* (Wien et al. 2014). Proceedings from the seventh conference will also be published in the same journal.

The popular USDA Food Guide Pyramid became the framework for the Vegetarian Food Guide Pyramid, a publication of the General Conference Nutrition Council of SDAs. A somewhat similar pyramid was presented at the Third Congress. The pyramid-shaped graphic illustration and supporting document was specifically designed for vegetarians (Haddad et al. 1999). The five major plant food groups (whole grains, legumes, vegetables, fruit, nuts, and seeds) form the trapezoid-shaped lower portion of the pyramid. Optional food groups, which may be avoided by some vegetarians (vegetable oils, dairy, eggs, and sweets), form the smaller, separate, triangle-shaped top portion of the pyramid (Haddad et al. 1999). Lenore Hodges, PhD, RD and Georgia Hodgkin, EdD, RD, FADA, authors of the Vegetarian Pyramid, changed the food graphic to the MyVegetarian Plate following the change by the US Department of Agriculture. A summary from the Fifth Congress on Vegetarian Nutrition included a recommendation that future U.S. dietary guidelines follow the lead of the 2005 Dietary Guidelines Advisory Committee and emphasize food-based recommendations and thinking to the full extent that evidence allows (Jacobs et al. 2009).

The Loma Linda expertise was acknowledged in a CRC Press book entitled, "Vegetarian Nutrition", authored predominantly by LLU faculty and edited by Dr. Joan Sabate (Vegetarian Nutrition 2001). Furthermore, the vegetarian guidelines such as the Loma Linda pyramid and ADA vegetarian recommendations have been adapted into guidelines by other organizations, such as the Japanese Vegetarian Food Guide, the VegPyramid of the Scientific Society of Vegetarian Nutrition (SSNV-Italy), and Power Plate by Physician Committee for Responsible Medicine (PCRM-USA) (Baroni 2015).

## 4. Discussion

This review was not able to adequately cover the many individuals and organizations, both within the United States and throughout much of the world, who have worked or continue to work to advance the Adventist message on diet. However, we have introduced some of the key individuals in order to demonstrate the thesis of an Adventist global impact on diet. These include Ellen G. White who was instrumental in linking elements of the American diet reforms of the 1800's to the theology and practice of a 'remnant' church. Another key individual was John Harvey Kellogg, who operationalized the Adventist message in a medically-oriented sanitarium. JH Kellogg and his family also worked to operationalize the Adventist message through a food industry. Mervyn G. Hardinge led an effort to demonstrate through research the health benefits of a vegetarian diet. Later Adventists were able to point to those research findings in making professional recommendations for a vegetarian diet. In addition to key historical figures, there are many organizations, such as food producers, schools, and health care facilities which together truly have a global impact on diet. Thus, the Seventh-day Adventist Church was able to incorporate and influence positive public health in society as well as play a role in the mainstream financial life of many nations.

Indeed, the Seventh-day Adventist Church is well-known for its healthcare and educational institutions spread around the globe, with a size and scope that belies its relatively small membership

numbers compared to other major world religions. There is no doubt that these institutions have an influence on the lifestyle, including diet, of the millions of patients who are treated and on the millions of students who are educated, particularly those who live on campus and/or eat in school cafeterias. Unfortunately from an academic standpoint, there are surprisingly few peer-reviewed publications which address the impact of SDA healthcare and educational systems on population-level diet.

Particularly as a result of combining religion/health/medicine in the form of sanitariums, the SDA Church also began to produce vegetarian foods for the benefit of church members and the general public. Both the formal SDA Church and Adventists working independently of Church supervision, were heavily involved in developing and producing vegetarian food products in the 1900's. Their involvement with food production resulted in the mass production of many different foods, including breakfast cereals, meat analogues, and soy milk. The fact that much of current production is no longer under control of the SDA Church, perhaps a disappointment for some within the faith, is a demonstration of the growing wide-spread acceptance of vegetarian foods and a function of substantial for-profit potential. However, the for-profit nature of the business has led to plant foods such as high sugar cereals, which are not as healthy. The simple processing of the late 1800's has given way to more extensive processing and low nutritional value aspects, such as sugar, salt, stabilizing, texture, and flavoring additives. Though the movement of nutrition science and policy since the turn of the current century has been towards whole cereal grain consumption, the modern Kellogg company has generally not embraced that movement as much as other breakfast cereal companies. Regardless, it is appropriate to acknowledge the positive impact of developing several sectors of the food industry. Furthermore, the Adventist food industry has contributed financially towards research and advocacy, such as in supporting the International Congresses on Vegetarian Nutrition.

After presenting the health message for many decades based largely on the writings of Ellen G. White, the Church dedicated resources to scientifically study the health benefits of the SDA lifestyle, especially diet. With the passage of half a century, during which Adventist researchers were able to secure millions of dollars of funding from the National Institutes of Health, there is now a large body of peer-reviewed publications and the broader society generally accepts that there are benefits of vegetarianism, independent of any religious message. It has been argued that a paradigm shift has occurred within the professional world, from a model which viewed a vegetarian diet primarily in terms of deficits compared to a meat-based diet, to a model in which a vegetarian diet is perceived as most healthful and a meat-based diet has deficits, such as in phytochemicals and fiber (Sabate 2003). As noted by Hardinge, societal "attitudes toward vegetarian diets have progressed from ridicule and skepticism to condescending tolerance, to gradual and sometimes grudging acceptance, and finally to acclaim" (Johnston 1999). Furthermore, there is also scientific evidence of a synergistic benefit of religion and diet/lifestyle.

The Adventist Health Studies were designed as prospective cohort research studies. As outlined in epidemiology textbooks, there are strengths and weaknesses associated with any study design (Gordis 2014). Cohort studies are especially good at exploring associations between exposures (such as diet) and multiple outcomes (such as disease and mortality). Drawbacks include cost (need to enroll many subjects) and long time period needed to observe health outcome (since subjects do not have a disease at beginning of study). Indeed, many cohort studies must be maintained for decades to yield meaningful results. Cohort studies are not strong for describing a population (best to use a cross-sectional study design) or in proving a relationship between two variables (best to use randomized controlled trial study design, although often this is not practical or ethical). Potential biases in cohort studies include selection biases, such as differential non-response and follow-up loss, information biases, and as true of any study design, bias in analysis by the researchers and statisticians if they have strong preconceptions (Gordis 2014). However, it is important to note that most Adventist research has compared Adventists to other Adventists who have somewhat different lifestyles, beliefs, or adherences. Cost is not a trivial issue, as Loma Linda University has needed to continue funding



the Adventist Health Studies even during periods when there was not funding from the National Institutes of Health.

Although cohort studies generally do not need to represent a particular population, some have questioned how well the Adventist Health Study represents Adventists in the United States, particularly African Americans. It has been observed that there are regional differences in church involvement, notably AHS participants in the southern US tend to be longer-time church members and also more involved with church activities compared to California participants (Lampkin et al. 2009). However, it is unlikely that such variations would invalidate observed relationships between diet and health status. Furthermore, recruitment into all health-oriented studies can be influenced by broader social forces such as racism and individual's perception of health care and perceived sense of control over their health (Lampkin et al. 2009).

The Adventist Church has been successful in presenting the personal health and spiritual benefits of a lifestyle which includes a vegetarian diet. However, it can do more with regards to diet. For example, future research could better quantify the costs and benefits at the society level of vegetarians' longer life. Greater organizational effort could be placed into advancing a "stewardship" model of population diet, which would include examining and mitigating the environmental impacts of modern food systems and more forcefully articulating the ethical and moral problems of a meat-based diet within the context of global poverty and food shortages.

In summary, during the 1800's the SDA church ultimately combined an evolving vegetarian perspective, an active evangelistic agenda, and a health ministry program, such that a vegetarian lifestyle was presented in many places around the world in a package that promoted a whole person and good health. As concluding exemplars, the Blue Zone books sponsored by National Geographic highlighted a handful of cities around the world in which a relatively large number of residents live to be at least 100 years of age, extensive information is available on their website (<https://www.bluezones.com>). The Blue Zones identified in the initial book (Buettner 2008) were: Sardinia, Italy; Okinawa, Japan; Nicoya Peninsula, Costa Rica; Icaria, Greece; and Loma Linda, California. Loma Linda made that list as a representative of Adventists, who have been demonstrated through research to have a longer and healthier life. Per the website, lessons learned from Loma Linda include the importance of a healthy social circle, social engagement, family, faith, moderate physical activity, and no smoking or alcohol. Food-specific lessons include plant-based diet, and consuming plenty of legumes, including soy, whole grains, and nuts. Finally, The Adventists Trilogy, three films produced by Martin Doblmeier which aired on PBS stations, presented not only on Adventist education and global health missions; but started by showing how the biblically-based approach to health and wholeness led to members living an extra 7–10 years longer than others. Thus, not only does the Adventist perspective on diet emphasize the wholeness of mind and body; it is difficult to present the Adventist message on diet without also presenting the whole Adventist "package" of theology, worship, health ministry, and education.

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## References

- 28 Fundamental Beliefs. 2015. General Conference of Seventh-Day Adventists. Available online: [https://szu.adventist.org/wp-content/uploads/2016/04/28\\_Beliefs.pdf](https://szu.adventist.org/wp-content/uploads/2016/04/28_Beliefs.pdf) (accessed on 26 June 2018).
- Abbey, David E., Paul K. Mills, Floyd F. Petersen, and W. Lawrence Beeson. 1991. Long-Term Ambient Concentrations of Total Suspended Particulates and Oxidants as Related to Incidence of Chronic Disease in California Seventh-Day Adventists. *Environmental Health Perspectives* 94: 43–50. [CrossRef] [PubMed]
- Abbey, David E., Naomi Nishino, William F. McDonnell, Raoul J. Burchette, Synnøve F. Knutsen, W. Lawrence Beeson, and Jie X. Yang. 1999. Long-Term Inhalable Particles and Other Air Pollutants Related to Mortality in Nonsmokers. *American Journal of Respiratory and Critical Care Medicine* 159: 373–82. [CrossRef] [PubMed]
- About Us. 2018. Available online: <http://weimar.org/about> (accessed on 26 June 2018).
- AHPA. 2017. AHPA Members. Available online: <http://adventisthealthpolicy.org/member-profiles/> (accessed on 27 July 2018).
- Baroni, Luciana. 2015. Vegetarianism in Food-Based Dietary Guidelines. *International Journal of Nutrition* 1: 48–73. [CrossRef]
- Beezhold, Bonnie L., Carol S. Johnston, and Deanna R. Daigle. 2009. Vegetarian Diets Are Associated with Healthy Mood States: A Cross-Sectional Study in Seventh Day Adventist Adults. *Nutrition Journal* 9: 26. [CrossRef] [PubMed]
- Bell, La Shawnta, Terry L. Butler, R. Patti Herring, Antonette K. Yancey, and Gary E. Fraser. 2005. Recruiting Blacks to the Adventist Health Study: Do Follow-up Phone Calls Increase Response Rates? *Annals of Epidemiology* 15: 667–72. [CrossRef] [PubMed]
- Bryan, G. C., J. A. Johnson, L. Dawes, and C. Samuel. 2012. An Assessment of the Risk Factors for Type 2 Diabetes among Women in Rural Jamaica. *West Indian Medical Journal* 61: 809–13. [PubMed]
- Buettner, Dan. 2008. *The Blue Zone: Lessons for Living Longer from the People Who've Lived the Longest*. Washington, DC: National Geographic.
- Bull, Malcolm. 1990. Secularization and Medicalization. *The British Journal of Sociology* 41: 245–61. [CrossRef] [PubMed]
- Butler, Jonathan. 1986. From Millerism to Seventh-Day Adventism: “Boundlessness to Consolidation”. *Church History* 55: 50–64. [CrossRef]
- Butler, Terry L., Gary E. Fraser, W. Lawrence Beeson, Synnove F. Knutsen, R. Patti Herring, Jacqueline Chan, Joan Sabate, Susanne Montgomery, Ella Haddad, Susan Preston-Martin, and et al. 2008. Cohort profile: The Adventist Health Study-2 (AHS-2). *International Journal of Epidemiology* 37: 260–5. [CrossRef] [PubMed]
- Campbell, Marci Kramish, Marlyn Allicock Hudson, Ken Resnicow, Natasha Blakeney, Amy Paxton, and Monica Baskin. 2007. Church-Based Health Promotion Interventions: Evidence and Lessons Learned. *Annual Review of Public Health* 28: 213–34. [CrossRef] [PubMed]
- Charlemagne-Badal, Sherma J., and Jerry W. Lee. 2016. Intrinsic Religiosity and Hypertension among Older North American Seventh-Day Adventists. *Journal of Religion and Health* 55: 695–708. [CrossRef] [PubMed]
- Charlemagne-Badal, Sherma J., and Jerry W. Lee. 2016b. Religious Social Support and Hypertension among Older North American Seventh-Day Adventists. *Journal of Religion and Health* 55: 709–28. [CrossRef] [PubMed]
- Chianu, Jonas N., Omo Ohiokpehai, Bernard Vanlauwe, A. Adesina, Hugo De Groote, and Nteranya Sanginga. 2008. Promoting a Versatile but yet Minor Crop: Soybean in the Farming Systems of Kenya. *Journal of Sustainable Development in Africa* 10: 722–47.
- Christiansen, Nanna Schneekloth, Annette Wittrup Schmidt, Christoffer Johansen, Lone Ross, Niels Christian Hvidt, and Lau Caspar Thygesen. 2015. Risk for Cardiovascular Disease among Seventh-Day Adventists and Baptists in Denmark, 1977–2009. *International Journal of Cardiology* 185: 133–35. [CrossRef] [PubMed]
- Connolly, Matt. 2013. Timeline: A Short and Sweet History of Fake Meat How We Became Obsessed with the Quest for the Perfect Faux Animal Protein. MotherJones. Available online: <https://www.motherjones.com/environment/2013/12/history-fake-meat/> (accessed on 26 June 2018).
- Denny, Ruby G. 1919. Need for Dietitians in Seventh-Day Adventist Sanitariums. *College of Medical Evangelists: The Medical Evangelist* 6: 11–19.
- Diehl, Hans A. 1998. Coronary Risk Reduction through Intensive Community-Based Lifestyle Intervention: The Coronary Health Improvement Project (Chip) Experience. *American Journal of Cardiology* 82: 83t–87t. [CrossRef]

- Doss, Gordon R. 2011. A Malawian Christian Theology of Wealth and Poverty. *International Journal of Missionary Research* 35: 148–52. [CrossRef]
- Eklof, Motzi. 2008. [Medicine on Mission: The International Health Reform of Seventh-Day Adventists and Their Health Care Facilities in Sweden]. *Svensk Medicinhistorisk Tidskrift* 12: 119–41. [PubMed]
- Ella May Hartlein, Credited with the Invention of the Haystack, Dies at 98. 2018. Available online: <https://www.adventistreview.org/church-news/story6270-ella-may-hartlein-credited-with-the-invention-of-the-haystack-dies-at-98> (accessed on 15 July 2018).
- Fonnebo, Vinjar. 1985. The Tromso Heart Study: Coronary Risk Factors in Seventh-Day Adventists. *American Journal of Epidemiology* 122: 789–93. [CrossRef] [PubMed]
- Fonnebo, Vinjar. 1992a. Coronary Risk Factors in Norwegian Seventh-Day Adventists: A Study of 247 Seventh-Day Adventists and Matched Controls. The Cardiovascular Disease Studies in Norway. *American Journal of Epidemiology* 135: 504–8. [CrossRef]
- Fonnebo, Vinjar. 1992b. Mortality in Norwegian Seventh-Day Adventists 1962–1986. *Journal of Clinical Epidemiology* 45: 157–67. [CrossRef]
- Fonnebo, Vinjar, and Are Helseth. 1991. Cancer Incidence in Norwegian Seventh-Day Adventists 1961 to 1986. Is the Cancer-Life-Style Association Overestimated? *Cancer* 68: 666–71. [CrossRef]
- Ford, Patricia A., Karen Jaceldo-Siegl, Jerry W. Lee, Wes Youngberg, and Serena Tonstad. 2013. Intake of Mediterranean Foods Associated with Positive Affect and Low Negative Affect. *Journal of Psychosomatic Research* 74: 142–48. [CrossRef] [PubMed]
- Ford, Patricia A., Karen Jaceldo-Siegl, Jerry W. Lee, and Serena Tonstad. 2016. Trans Fatty Acid Intake Is Related to Emotional Affect in the Adventist Health Study-2. *Nutrition Research* 36: 509–17. [CrossRef] [PubMed]
- Fraser, Gary E. 1999. Associations between Diet and Cancer, Ischemic Heart Disease, and All-Cause Mortality in Non-Hispanic White California Seventh-Day Adventists. *The American Journal of Clinical Nutrition* 70: 532S–38S. [CrossRef] [PubMed]
- Fraser, Gary E. 2003. *Diet, Life Expectancy, and Chronic Disease: Studies of Seventh-Day Adventists and Other Vegetarians*. New York: Oxford University Press.
- Fraser, Gary E. 2009. Vegetarian Diets: What Do We Know of Their Effects on Common Chronic Diseases? *The American Journal of Clinical Nutrition* 89: 1607S–12S. [CrossRef] [PubMed]
- Fraser, Gary E., and David J. Shavlik. 1997. Risk Factors for All-Cause and Coronary Heart Disease Mortality in the Oldest-Old. The Adventist Health Study. *Archives of Internal Medicine* 157: 2249–58. [CrossRef] [PubMed]
- Fraser, Gary E., and David J. Shavlik. 2001. Ten Years of Life: Is It a Matter of Choice? *Archives of Internal Medicine* 161: 1645–52. [CrossRef] [PubMed]
- Fraser, Gary E., W. Lawrence Beeson, and Ronald L. Phillips. 1991. Diet and Lung Cancer in California Seventh-Day Adventists. *American Journal of Epidemiology* 133: 683–93. [CrossRef] [PubMed]
- Fraser, Gary E., Joan Sabate, W. Lawrence Beeson, and T. Martin Strahan. 1992. A Possible Protective Effect of Nut Consumption on Risk of Coronary Heart Disease. The Adventist Health Study. *Archives of Internal Medicine* 152: 1416–24. [CrossRef] [PubMed]
- Gall, Stephanie, and Megan Salazar. 2012. Revamping a Vegetarian, Seventh-Day Adventist School Lunch Program. Available online: <https://www.vrg.org/blog/2012/02/02/revamping-a-vegetarian-seventh-day-adventist-school-lunch-program/> (accessed on 20 July 2018).
- Gordis, Leon. 2014. *Epidemiology*, 5th ed. Philadelphia: Elsevier Saunders.
- Haddad, Ella H., Joan Sabate, and Crystal G. Whitten. 1999. Vegetarian Food Guide Pyramid: A Conceptual Framework. *The American Journal of Clinical Nutrition* 70: 615S–19S. [CrossRef] [PubMed]
- Harman, Sarinah K., and Winsome R. Parnell. 1998. The Nutritional Health of New Zealand Vegetarian and Non-Vegetarian Seventh-Day Adventists: Selected Vitamin, Mineral and Lipid Levels. *New Zealand Medical Journal* 111: 91–94. [PubMed]
- Herring, R. Patti, Terry Butler, Sonja Hall, Susanne B. Montgomery, and Gary E. Fraser. 2010. Recruiting Black Americans in a Large Cohort Study: The Adventist Health Study-2 (Ahs-2) Design, Methods and Participant Characteristics. *Ethnicity & Disease* 20: 437–43.
- History of the American Dietetic Association's Vegetarian Position Papers, Part Three: 1988. Available online: <http://letthemeatmeat.com/post/24114978723/1988> (accessed on 26 June 2018).

- History of the American Dietetic Association's Vegetarian Position Papers, Part One: Why Seventh-Day Adventists Want to Prove That Vegetarianism Is the Healthiest Diet, and How They Influenced the Ada/Academy of Nutrition and Dietetics. 2012. Available online: <http://letthemeatmeat.com/post/22315152288/history-of-the-american-dietetic-associations> (accessed on 26 June 2018).
- Hokin, Bevan D., and Terry Butler. 1999. Cyanocobalamin (Vitamin B-12) Status in Seventh-Day Adventist Ministers in Australia. *The American Journal of Clinical Nutrition* 70: 576S–78S. [CrossRef] [PubMed]
- Holt, Megan Elizabeth, Jerry W. Lee, Kelly R. Morton, and Serena Tonstad. 2014. Mediterranean Diet and Emotion Regulation. *Mediterranean Journal of Nutrition and Metabolism* 7: 163–72.
- Holt, Megan E., Jerry W. Lee, Kelly R. Morton, and Serena Tonstad. 2015. Trans Fatty Acid Intake and Emotion Regulation. *Journal of Health Psychology* 20: 785–93. [CrossRef] [PubMed]
- Jacobs, David R., Jr., Ella H. Haddad, Amy Joy Lanou, and Mark J. Messina. 2009. Food, Plant Food, and Vegetarian Diets in the Us Dietary Guidelines: Conclusions of an Expert Panel. *The American Journal of Clinical Nutrition* 89: 1549S–52S. [CrossRef] [PubMed]
- Jacobsen, Bjarne K., Synnøve F. Knutsen, and Gary E. Fraser. 1998. Does High Soy Milk Intake Reduce Prostate Cancer Incidence? The Adventist Health Study (United States). *Cancer Causes Control* 9: 553–57. [CrossRef] [PubMed]
- Jedrychowski, Wieslaw, Beata Tobiasz-Adamczyk, Antoni Olma, and Piotr Gradzikiewicz. 1985. Survival Rates among Seventh Day Adventists Compared with the General Population in Poland. *Scandinavian Journal of Socical Medicine* 13: 49–52. [CrossRef]
- Jensen, Ole M. 1983. Cancer Risk among Danish Male Seventh-Day Adventists and Other Temperance Society Members. *Journal of the National Cancer Institute* 70: 1011–14. [PubMed]
- Johnston, Patricia K. 1999. Recognition—Mervyn G Hardinge. *American Journal of Clinical Nutrition* 70: 431s–32s.
- Kahn, Harold A., Roland L. Phillips, David A. Snowdon, and Wareen Choi. 1984. Association between Reported Diet and All-Cause Mortality. Twenty-One-Year Follow-up on 27,530 Adult Seventh-Day Adventists. *American Journal of Epidemiology* 119: 775–87. [CrossRef] [PubMed]
- Kamila, Avery Yale. 2010. Medical Center's Cafe Promotes Health with Vegetarian Menu. Available online: [https://www.pressherald.com/2010/03/31/medical-centers-cafe-promotes-health-with-vegetarian-menu\\_2010-03-31/](https://www.pressherald.com/2010/03/31/medical-centers-cafe-promotes-health-with-vegetarian-menu_2010-03-31/) (accessed on 27 July 2018).
- Kaplan, Sue A., Neil S. Calman, Maxine Golub, Charmaine Ruddock, and John Billings. 2006. The Role of Faith-Based Institutions in Addressing Health Disparities: A Case Study of an Initiative in the Southwest Bronx. *Journal of Health Care for the Poor and Underserved* 17: 9–19. [CrossRef] [PubMed]
- Kellogg, John H. 1891. Requisites for a Closed Sanitarium in Colorado. *Transaction of the American Climatology Association Meeting* 7: 107–27.
- Key, Timothy J., Gary E. Fraser, Margaret Thorogood, Paul N. Appleby, Valerie Beral, Gillian Reeves, Michael L. Burr, Jenny Chang-Claude, Rainer Frentzel-Beyme, Jan W. Kuzma, and et al. 1999. Mortality in Vegetarians and Non-Vegetarians: Detailed Findings from a Collaborative Analysis of 5 Prospective Studies. *American Journal of Clinical Nutrition* 70: 516S–24S. [CrossRef] [PubMed]
- Kristensen, Marlene D., Nathalie T. Bendsen, Sheena M. Christensen, Arne Astrup, and Anne Raben. 2016. Meals Based on Vegetable Protein Sources (Beans and Peas) Are More Satiating Than Meals Based on Animal Protein Sources (Veal and Pork)—A Randomized Cross-over Meal Test Study. *Food and Nutrition Research* 60: 32634. [CrossRef] [PubMed]
- Kumar, Pavan, M. K. Chatli, Nitin Mehta, Parminder Singh, O. P. Malav, and Akhilesh K. Verma. 2017. Meat Analogues: Health Promising Sustainable Meat Substitutes. *Critical Review in Food Science and Nutrition* 57: 923–32. [CrossRef] [PubMed]
- Lampkin, Andy, Antronette Yancey, Colwick Wilson, and Gary F. Fraser. 2009. Why Do Only Some Seventh-Day Adventists Participate in Research Studies? *Ethnic Disparities* 19: 479.
- Land, Gary. 2001. At the Edges of Holiness: Seventh-Day Adventism Receives the Holy Ghost, 1892–1900. *Fides et Historia* XXXIII: 13–30.
- Lawson, Ronald. 1998. Seventh-Day Adventists and the U.S. Courts: Road Signs Along the Route of a Denominationalizing Sect. *Journal of Church and State* 40: 553–88. [CrossRef]
- Lawson, Ronald, and Ryan T. Cragun. 2012. Comparing the Geographic Distributions and Growth of Mormons, Adventists, and Witnesses. *Journal for the Scientific Study of Religion* 51: 220–40. [CrossRef]



- Le, Lap T., and Joan Sabate. 2014. Beyond Meatless, the Health Effects of Vegan Diets: Findings from the Adventist Cohorts. *Nutrients* 6: 2131–47. [[CrossRef](#)] [[PubMed](#)]
- Lee, Jerry W., Kelly R. Morton, James Walters, Denise L. Bellinger, Terry L. Butler, Colwick Wilson, Eric Walsh, Christopher G. Ellison, Monica M. McKenzie, and Gary E. Fraser. 2009. Cohort Profile: The Biopsychosocial Religion and Health Study (Brhs). *International Journal of Epidemiology* 38: 1470–78. [[CrossRef](#)] [[PubMed](#)]
- Linkosalo, Eeva. 1988. Dietary Habits and Dental Health in Finnish Seventh-Day Adventists. *Proceedings of the Finnish Dental Society* 84: 109–15.
- Markens, Susan, Sarah A. Fox, Bonnie Taub, and Mary Lou Gilbert. 2002. Role of Black Churches in Health Promotion Programs: Lessons from the Los Angeles Mammography Promotion in Churches Program. *American Journal of Public Health* 92: 805–10. [[CrossRef](#)] [[PubMed](#)]
- Marlow, Harold J., William K. Hayes, Samuel Soret, Ronald L. Carter, Ernest R. Schwab, and Joan Sabate. 2009. Diet and the Environment: Does What You Eat Matter? *The American Journal of Clinical Nutrition* 89: 1699S–703S. [[CrossRef](#)] [[PubMed](#)]
- McAnulty, Judy, and Robert Scragg. 1996. Body Mass Index and Cardiovascular Risk Factors in Pacific Island Polynesians and Europeans in New Zealand. *Ethnicity & Health* 1: 187–95.
- McKinney, Ogbochi, Naomi N. Modeste, Jerry W. Lee, Peter C. Gleason, and Gisele Maynard-Tucker. 2014. Determinants of Antiretroviral Therapy Adherence among Women in Southern Malawi: Healthcare Providers' Perspectives. *AIDS Research and Treatment* 2014: 489370. [[CrossRef](#)] [[PubMed](#)]
- Melina, Vesanto, Winston Craig, and Susan Levin. 2016. Position of the Academy of Nutrition and Dietetics: Vegetarian Diets. *Journal of the Academy Nutrition and Dietetics* 116: 1970–80. [[CrossRef](#)] [[PubMed](#)]
- Mills, Paul K., W. Lawrence Beeson, Roland L. Phillips, and Gary E. Fraser. 1989. Cohort Study of Diet, Lifestyle, and Prostate Cancer in Adventist Men. *Cancer* 64: 598–604. [[CrossRef](#)]
- Morton, Darren, Paul Rankin, Lillian Kent, Rex Sokolies, Wayne Dysinger, John Gobble, and Hans Diehl. 2014. The Complete Health Improvement Program (Chip) and Reduction of Chronic Disease Risk Factors in Canada. *Canadian Journal of Dietetic Practice and Research* 75: 72–77. [[CrossRef](#)] [[PubMed](#)]
- Morton, Kelly R., Jerry W. Lee, and Leslie R. Martin. 2017. Pathways from Religion to Health: Mediation by Psychosocial and Lifestyle Mechanisms. *Psychology of Religion and Spirituality* 9: 106–17. [[CrossRef](#)] [[PubMed](#)]
- Nath, Jemal. 2010. 'God Is a Vegetarian': The Food, Health and Bio-Spirituality of Hare Krishna, Buddhist and Seventh-Day Adventist Devotees. *Health Sociology Review* 19: 356–68. [[CrossRef](#)]
- Ngozi, Elizabeth O., Silifat A. Sanni, Bolade K. Adeoye, and Ademola R. Akinlade. 2017. Macro-Nutrient Composition of Vegetarian Meals Consumed by Undergraduate Students of Babcock University. *International Journal of Food Science and Nutrition* 2: 79–83.
- Orlich, Michael J., and Gary E. Fraser. 2014. Vegetarian Diets in the Adventist Health Study 2: A Review of Initial Published Findings. *The American Journal of Clinical Nutrition* 100 S1: 353S–58S. [[CrossRef](#)]
- Orlich, Michael J., Pramil N. Singh, Joan Sabate, Karen Jaceldo-Siegl, Jing Fan, Synnove Knutsen, W. Lawrence Beeson, and Gary E. Fraser. 2013. Vegetarian Dietary Patterns and Mortality in Adventist Health Study 2. *JAMA Internal Medicine* 173: 1230–38. [[CrossRef](#)] [[PubMed](#)]
- Phillips, Roland L. 1975. Role of Life-Style and Dietary Habits in Risk of Cancer among Seventh-Day Adventists. *Cancer Research* 35: 3513–22. [[PubMed](#)]
- Phillips, Roland L. 1980. Cancer among Seventh-Day Adventists. *Journal of Environmental Pathology Toxicology* 3: 157–69. [[PubMed](#)]
- Sabate, Joan. 2003. The Contribution of Vegetarian Diets to Health and Disease: A Paradigm Shift? *The American Journal of Clinical Nutrition* 78: 502S–7S. [[CrossRef](#)] [[PubMed](#)]
- Sabate, Joan, Gary E. Fraser, Kenneth Burke, Synnove F. Knutsen, Hannelore Bennett, and Kristian D. Lindst. 1993. Effects of Walnuts on Serum Lipid Levels and Blood Pressure in Normal Men. *The New England Journal of Medicine* 328: 603–7. [[CrossRef](#)] [[PubMed](#)]
- Sabate, Joan, and Sam Soret. 2014. Sustainability of Plant-Based Diets: Back to the Future. *The American Journal of Clinical Nutrition* 100 S1: 476S–82S. [[CrossRef](#)]
- Sabate, Joan, Kitti Sranacharoenpong, Helen Harwatt, Michelle Wien, and Samuel Soret. 2015. The Environmental Cost of Protein Food Choices—Corrigendum. *Public Health Nutrition* 18: 2096. [[CrossRef](#)] [[PubMed](#)]
- Sanchez, Ruben, Ramon Gelabert, Yasna Badilla, and Carlos Del Valle. 2016. Feeding Holy Bodies: A Study on the Social Meanings of a Vegetarian Diet to Seventh-Day Adventist Church Pioneers. *HTS Theologiese Studies/Theological Studies* 72: A3080. [[CrossRef](#)]



- Sanitarium—Our Story. 2018. Available online: <https://www.sanitarium.com.au/about/sanitarium-story> (accessed on 25 June 2018).
- Sboros, Marika. 2017. Medical Evangelism: A Hand out for Bad Diet Advice? Available online: [foodmed.net/2017/08/medical-evangelism-adventist-diet-advice/](http://foodmed.net/2017/08/medical-evangelism-adventist-diet-advice/) (accessed on 26 June 2018).
- SDA. 2018. Seventh-Day Adventist World Church Statistics. Available online: <https://www.adventist.org/> (accessed on 26 July 2018).
- Seventh-Day Adventist Dietetic Association. 2010. Available online: <http://worldcat.org/identities/lccn-n79041880/> (accessed on 26 June 2018).
- Shurtleff, William, and Akiko Aoyagi. 2004. Adventist Cookbook Authors: Work with Soyfoods. Available online: [http://www.soyinfocenter.com/HSS/adventist\\_soyfoods\\_cookbook\\_authors.php](http://www.soyinfocenter.com/HSS/adventist_soyfoods_cookbook_authors.php) (accessed on 24 May 2018).
- Shurtleff, William, and Akiko Aoyagi. 2014. *History of Seventh-Day Adventist Work with Soyfoods, Vegetarianism, Meat Alternatives, Wheat Gluten, Dietary Fiber and Peanut Butter (1863–2013): Extensively Annotated Bibliography and Sourcebook*. Lafayette: SoyInfo Center.
- Silva, Leilane Bagno, Stael Silvana Silva, Amanda Garcia Marcilio, and Angela Maria Pierin. 2012. Prevalence of Arterial Hypertension among Seventh-Day Adventists of the Sao Paulo State Capital and Inner Area. *Arquivos Brasileiros De Cardiologia* 98: 329–37. [CrossRef] [PubMed]
- Singh, Pramil N., and Gary E. Fraser. 1998. Dietary Risk Factors for Colon Cancer in a Low-Risk Population. *American Journal of Public Health* 148: 761–74. [CrossRef]
- Sociak, Emilia, and Elzbieta Bartnikowska. 2008. Dietary Assessment of Males from Seventh-Day Adventist Church in Warsaw. *Roczniki Panstwowego Zakladu Higieny* 59: 361–66.
- Smith-Warner, Stephanie A., Donna Spiegelman, Shiao-Shyuan Yaun, Hans-Olov Adami, W. Lawrence Beeson, Piet A. van den Brandt, Aaron R. Folsom, Gary E. Fraser, Jo L. Freudenheim, R. Alexandra Goldbohm, and et al. 2001. Intake of Fruits and Vegetables and Risk of Breast Cancer: A Pooled Analysis of Cohort Studies. *JAMA* 285: 769–76. [CrossRef] [PubMed]
- Snowdon, David A., and Roland L. Phillips. 1985. Does a Vegetarian Diet Reduce the Occurrence of Diabetes? *American Journal of Public Health* 75: 507–12. [CrossRef] [PubMed]
- Soret, Samuel, Alfredo Mejia, Michael Batech, Karen Jaceldo-Siegl, Helen Harwatt, and Joan Sabate. 2014. Climate Change Mitigation and Health Effects of Varied Dietary Patterns in Real-Life Settings Throughout North America. *The American Journal of Clinical Nutrition* 100: 490S–95S. [CrossRef] [PubMed]
- The Battle Creek Idea. 2009. Available online: [http://www.heritagebattlecreek.org/index.php?option=com\\_content&view=article&id=95&Itemid=73](http://www.heritagebattlecreek.org/index.php?option=com_content&view=article&id=95&Itemid=73) (accessed on 25 June 2018).
- The Bistro. 2018. Available online: <https://www.adventisthealth.org/castle/pages/patients-and-visitors/the-bistro.aspx> (accessed on 27 July 2018).
- Thygesen, Lau Caspar, Niels Christian Hvidt, Helle Ploug Hansen, Andreas Hoff, Lone Ross, and Christoffer Johansen. 2012. Cancer Incidence among Danish Seventh-Day Adventists and Baptists. *Cancer Epidemiology* 36: 513–18. [CrossRef] [PubMed]
- Thygesen, Lau Caspar, Niels Christian Hvidt, Knud Juel, Andreas Hoff, Lone Ross, and Christoffer Johansen. 2012b. The Danish Religious Societies Health Study. *International Journal of Epidemiology* 41: 1248–55. [CrossRef] [PubMed]
- Tonstad, Serena, Terry Butler, Ru Yan, and Gary E. Fraser. 2009. Type of Vegetarian Diet, Body Weight, and Prevalence of Type 2 Diabetes. *Diabetes Care* 32: 791–96. [CrossRef] [PubMed]
- Van den Brandt, Piet A., Donna Spiegelman, Shiao-Shyuan Yaun, Hans-Olov Adami, Lawrence Beeson, Aaron Folsom, G. Fraser, R. A. Goldbohm, S. Graham, L. Kushi, and et al. 2000. Pooled Analysis of Prospective Cohort Studies on Height, Weight, and Breast Cancer Risk. *American Journal of Epidemiology* 152: 514–27. [CrossRef] [PubMed]
- Vegetarian Nutrition. 2001. *The CRC Series in Modern Nutrition*. Boca Raton: CRC Press.
- Vyhmeister, Irma B. 1984. Nutrition Evangelism: New Opportunities for Laypeople. *Adventist Review*, June 29, 20–21.
- What Is AHI? 2018. Available online: <http://www.ahiglobal.org/main/home/> (accessed on 27 July 2018).
- White, Ellen G. 1976. *Counsels on Diets and Food*. Washington, DC: Review and Herald.

Wien, Michelle, Sujatha Rajaram, and Joan Sabate. 2014. Preface to the Sixth International Congress on Vegetarian Nutrition. *The American Journal of Clinical Nutrition* 100: 311S–312S. [[CrossRef](#)] [[PubMed](#)]

Young, Eleanor A. 1983. 20th Lenna Frances Cooper Memorial Lecture: Nutrition: An Integral Aspect of Medical Education. *Journal of The American Dietetic Association* 82: 482–92. [[PubMed](#)]



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