India's Medical Diversity:

Hybridization in people's use of medicine in Adhi, Punjab

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Introduction

Due to ongoing hybridization of Indian culture in general, evidence of hybridization can be seen in many subdivisions of culture such as fashion, music, food, sports, and medicine. For centuries, use and knowledge of medicine has diffused and been combined from various regions of the world to form the hybrid and diverse healthcare available in India today. Western medicine, also known as biomedicine or modern medicine, is widely available in the cities of India; however, only 30% of India is urbanized. Thus, the majority of the population does not have direct access to western health care facilities and must travel to the nearest city to see a western healthcare professional. Many still practice herbal folk medicine, but as westernization continues, biomedicine is becoming increasingly available even in rural areas. The more recent diffusion of western medicine to rural villages has allowed villagers to adopt and reject elements of local medicinal practices and biomedicine, thus forming a hybrid medicinal culture.

The renowned psychiatrist, philosopher, and author Frantz Fanon, formed the concept of the "colonization of the mind" with reference to the exploitation of colonies and the indigenous and local populations during colonialism and neocolonialism. He proposed that Europeans psychologically dehumanized native populations, which led the natives to believe they were truly inferior to Europeans. Decades later, ex-colonies often perceive themselves as inferior to western society and carry the notion that they must adopt western culture in order to be considered equals. As a former British colony, remnants of British culture are evident in India's extreme love for cricket, its parliamentary democracy, and the adoption of western fashion; however, to automatically deduce that what we see is a result of India's colonial past may be too simplistic. Many people in developing countries

today want to emulate what they see in developed countries, and although Fanon provides some insight into this phenomenon, it is too simplistic to attribute all westernization to his theory. Fanon's theory and the prevalence of British culture in present day India have rather inspired me to research the presence of western medicine and health infrastructure in India. This paper serves to explore different reasons behind the adoption of biomedicine in rural India and whether the increasing popularity of biomedicine has caused a decline in the practice, preparation, and knowledge of herbal folk medicine.

Herbal remedies are passed down through generations and require extensive knowledge of plant roots, plant extracts, herbs, spices, and other natural resources. This ethnobotanical knowledge is generally passed down orally through generations within families. Due to a decline of experiential learning and an increase in institutionalized western education, some scholars argue that a loss of local knowledge occurs when western ideologies infiltrate other cultures. Other studies reveal opposition to western medicine and the continued practice of folk medicine by villagers. Yet several scholars have rather observed that people pick and choose medicinal treatments from various regions of the world based on the perceptions of efficacy and efficiency of remedies; this integration of different forms of medicine provides an example of the hybridization paradigm of cultural globalization. Having heard of increasing use of western medicine in rural Punjab, I decided to travel there to collect data on the medicinal practices in villages. Using the state of Punjab as the definition for parameters of *local*, I propose that a decline in the practice and knowledge of local herbal remedies could be occurring with each successive generation in rural Punjab due to hybridization of medicine and an observed trend of increased use of biomedicine. My quantitative research will focus on determining whether

or not a loss of folk medicinal knowledge is occurring. My qualitative research will not only complement the quantitative data, but also further explore the reasons behind villagers' decisions to accept or reject certain elements of home remedies and western treatments.

In my research I will explore the relationship between age, gender, education, proximity to a healthcare facility, wealth, occupation and the amount of known ethnobotanical knowledge, as well as the perception of folk medicine versus biomedicine.

Importance of the Research Topic and Positionality of the Researcher

Globalization has led to hybridization of cultures due to flows of information, people, and commodities worldwide. Information on hybridization of medicine in several regions of the world is widely available; however, for my research I only consulted literature written in the English language. Most of this literature focuses on medical pluralism and the combination of various medical practices. There is little research regarding a possible decline in the use of folk medicine. Furthermore, among the literature I consulted, there was no information on the diversity of medical practices in Punjab, India.

After doing extensive research of literature on the survival or loss of folk medicine in the light of westernization, I observed that the majority of scholarly work focuses on China and Latin America, while much of the research occurring in India regarding herbal medicine places an emphasis on recording the biological composition of the remedies used and their purposes. The aim of my research is to go beyond just understanding the practice of herbal folk medicine and investigate the perception and quantifiable knowledge of local herbal remedies.

An important distinction to make is the difference between Ayurveda and local folk remedies. Although Ayurvedic treatments and medicine involve the use of natural ingredients and a holistic methodology similar to folk remedies, Ayurveda is a millennia-old, scientific, institutionalized study of the human body and medicine. In order to practice Ayurveda, one must gain a formal education and training at an accredited university. Unlike folk remedies that are prepared at home, Ayurvedic medication comes in the form of manufactured pills or tablets, available at pharmacies, or a licensed Ayurvedic physician directly provides it to patients. My aim was to explore to which extent western medicine has caused a diminished use of local herbal remedies, not Ayurveda.

The phenomenon of "biopiracy" should also be considered as evidence of the multi-directional flow of information and culture, especially between India and the West. Western pharmaceutical companies have been appropriating folk and Ayurvedic knowledge, obtaining international patents on these formulas and ingredients. This means that even the term "Western" itself can be seen as inaccurate, as many ingredients in "Western medicine" are from around the world. Furthermore, there is currently a growing interest in the western countries regarding herbal, natural, and traditional medications and treatments. For example, Ayurvedic products are now available in the U.S. in various stores. Therefore, hybridization medicine is not only specific to developing nations. The process involves the conscious adoption and rejection of components of both cultures by both cultures. Information is exchanged and people have the autonomy to pick and choose elements of either culture they find practical or desirable, thus forming a new hybrid culture.

I am a first generation (born in the United States) American-Punjabi. The primary spoken language in my household was Punjabi. I am also able to read and write Punjabi. Due to my background as a Punjabi and my understanding of the Punjabi culture, I felt most inclined to study the perception of folk medicine in rural Punjab. Being a Punjabi-American, I feel as though I am an insider as well as an outsider in this research project. When I am in the U.S., I identify as being Punjabi and I actively incorporate the Punjabi culture in my daily life through music, food, and speaking the language. When I am in Punjab, however, I am often labeled as an American, which has an associated negative connotation. It is as if I am not in tune with my culture as much as native Punjabis and I have lost my culture by growing up in the U.S. Interestingly enough, many Punjabis living in rural areas have the same negative views of those who have moved to the cities in Punjab or those who are educated. Many opinions have been expressed in the media and songs have been sung by Punjabis from rural areas of the state regarding loss of the Punjabi culture due to rural-to-urban migration or due to western education; however, the opposite is true as well, many songs discuss western fashion, cars, and cities in a glorified manner.

My positionality as a researcher in Punjab therefore becomes conflicted. When geographers conduct research in settings that are culturally different than those of the geographer, they engage in cross-cultural research. This can pose challenges in making connections with participants and constantly battling an insider vs. outsider position, due to differences in cultural practices and accepted behaviors. Skelton (2009) describes the insider-outsider positionality as a binary because researchers often experience being an insider and an outsider simultaneously. Oftentimes, researchers are not fully welcomed or accepted into the society where they wish to conduct research. In order to create

connections with local inhabitants and enroll them in the study, sometimes an intermediate figure is needed, such as a translator, interpreter, or local research assistant (Skelton, 2009). Because of my conflicted identity, I chose to conduct my study in an area with which I am familiar: the village of Adhi in Punjab, India. I have distant relatives, Harjeet Kaur Nahal and her family, that live in Adhi who can act as intermediate figures between other villagers and me. I was well aware that in Punjab, outsiders are not welcomed into villages unless they have family that reside there or one has ancestral ties to farmland and residential property in the village. I faced the challenge of needing to demonstrate and prove I am just as Punjabi as the villagers. If they did not view me as similar to them, I knew I would not be able to break the barrier of being a foreigner. But with Harjeet's help, I was introduced to villagers and potential study participants and I was able to engage in daily conversation and activities with them. Hence, after a week or so, I established connections of trust and familiarity with villagers.

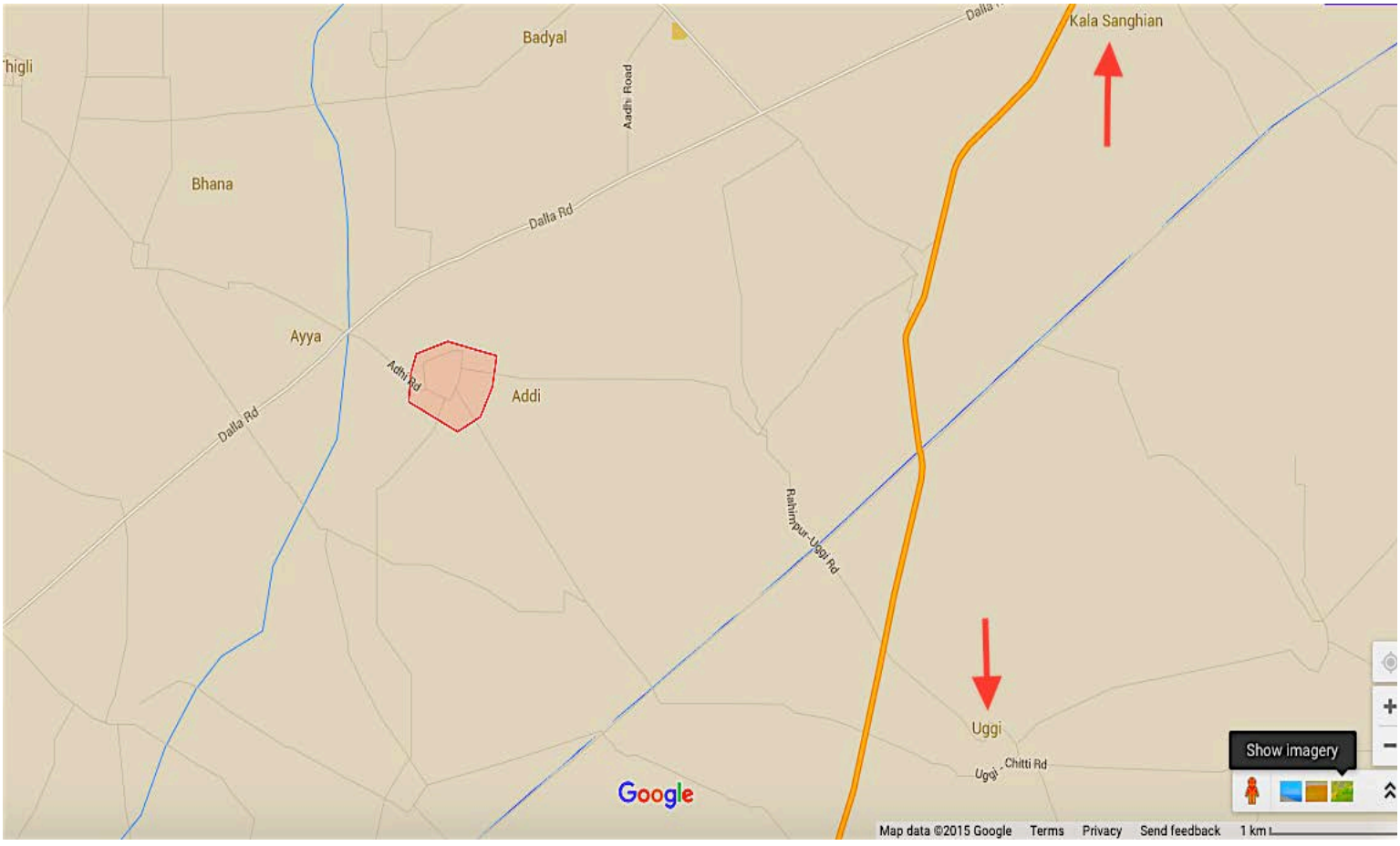
The duality of my cultural identity, as well as the above-mentioned feelings expressed in Punjabi folk music and interviews on television, inspired me to research how common such anti-westernization attitudes are. Perhaps Punjabi culture is eroding as urbanization and westernization are increasingly occurring in India, including the state of Punjab. Although, as a Punjabi-American, my identity is dynamic and hard to precisely define, residents of Punjab experience the same complexity behind identity as western culture is increasingly available and integrated into their lives and the Punjabi culture. Villagers in Punjab have the agency to freely pick and choose elements of both cultures they wish to incorporate into their lives based on practicality, personal likes and preferences, and availability.

If Punjabi culture, including folk medicine, is indeed diminishing as hybridization continues, however, important medical knowledge and skills will not be passed on to future generations in the traditional oral fashion as has been the case for centuries. There are several benefits of continuing the preparation and use of folk remedies, including: there are no adverse side effects, it is cost effective, and the ingredients are natural, organic and locally available, thus making home remedies good for both health and the environment. Also, for people who have limited access to means of transportation, immediate relief and treatment can be provided at home.

It is significant to study the practice of folk medicine in Punjab so that the local and ethnic knowledge can be sustained amidst the increasingly modernized practice of Indian medicine. Diminishing knowledge can have serious implications for a culture. Oral traditions passed down through generations could be lost and this can have negative implications for the preservation of certain aspects of a culture. Just as elements of a culture, such as language, can become extinct, I believe the experiential aspect of teaching and learning to prepare home remedies may potentially be lost in the future, and this would be unfortunate due to the essential role it plays in the proper practice of local medicine. A core part of the Punjabi culture in villages is to rely on knowledge passed down from generations to maintain independency (farming practices, cooking, preparing home remedies, etc.). Even as hybridization allows for the best of both local and western medicinal cultures to survive, the tradition of relying on one's knowledge and family practices may decline.

Background Information on the Research Site and Its Residents

In order to conclude whether or not there is a diminished use and practice of local ethnobotanical knowledge occurring in rural Punjab, I traveled to Adhi, a small village in the district of Jalandhar, during the month of July 2015. According to the 2011 Indian Census, there are 274 households in Adhi. Its total population is 1,474. Of the 1,474 people, 50 percent are males and 50 percent are females. Adhi is located approximately 2 km from the very small city of Uggi and approximately 3 km from the small city of Kala Sanghian. Villagers, especially females, expressed that they rarely travel far from Adhi. Local people often walk or ride bicycles, mopeds, or motorcycles to Uggi and Kala Sanghian to purchase daily household items such as groceries, soap, hair care products, toothbrushes, and cleaning products.



From observations, casual conversations, and informal interviews, I learned of gender roles and responsibilities and expectations of the various generations. Education was not seen as a priority among the elderly and middle-aged population. Many of the middle-aged men are farmers, while others work part-time jobs (photographer, driver, domestic worker, etc.). Some men also own large plots of land that they have leased for farming or live off of remittances sent home from family members abroad. Throughout the day, especially during lunch time and then again from the hours of 3:00pm to 6:00pm, I observed that many of the male villagers convened at a large tree near an open field used for recreation (volleyball and soccer). Under the shade of the tree on a large flat cement structure, the men would gamble and play cards for several hours. This was their daily routine. The younger males (approximately ages 18 to 30) typically either joined the older

men in lounging and chatting or formed their own smaller groups in the late afternoon after returning from their part time jobs or high school. Of the male villagers I met, none had completed or had any intentions of completing an education beyond "plus two" ("plus two" signifies the final two years of high school that involve a specialized pre-undergraduate study, sometimes called junior college, in which students will only take courses related to the major they wish to pursue in their undergraduate studies). I did not observe pressure or expectations from parents and family members for the young males to gain a higher education. The general consensus seems to be that as men, they will be expected to make a living one way or another and education requires too much effort and time. Most of the younger men aspired to leave the country altogether and come to the U.S. after seeing the riches that neighbors or extended family could buy with remittance money. Many of the large, new, four story villas in Adhi are locked up and vacant or are only occupied by a matriarch figure because families and especially sons or husbands have traveled abroad in hopes to make more money. I was told that all the expansive homes in Adhi were all recently constructed and they were built using remittance money. After spending several weeks in Adhi, I could see the clear distinction between the lavish homes of villagers with at least one family member working abroad and the small, poorly constructed, sometimes lacking proper plumbing, homes of those making a living without remittances.

The female population of Adhi held education to a higher standard than the male population. Although illiteracy was common among the elderly and middle-aged women, many of them expressed the desire for their children or grandchildren to be educated and go on to college. The only students currently enrolled in college or having completed an

education beyond “plus two” were females. Furthermore, from my interactions with villagers of all ages and genders, I noticed that the males did not take education as seriously as the females. Daughters were expected by their own parents, as well as by future in-laws to not only know how to cook and manage a household, but have a good education as well. No such emphasis on education seemed to be placed on sons, however. Despite the disparity in level and reverence of education between men and women, I did not encounter any women with employment in the formal sector or skilled-work. Women were either full-time homemakers or did domestic work part-time in the homes of their neighbors and fellow villagers during the day. If they were not yet married, they were either still in school, or their parents were looking to marry them off soon, and then they will be expected to be diligent homemakers. These gender roles and dynamic views of education and employment are important to understand, as they influence the perspectives men and women have of the practice and preparation of ethnobotanical knowledge and remedies.

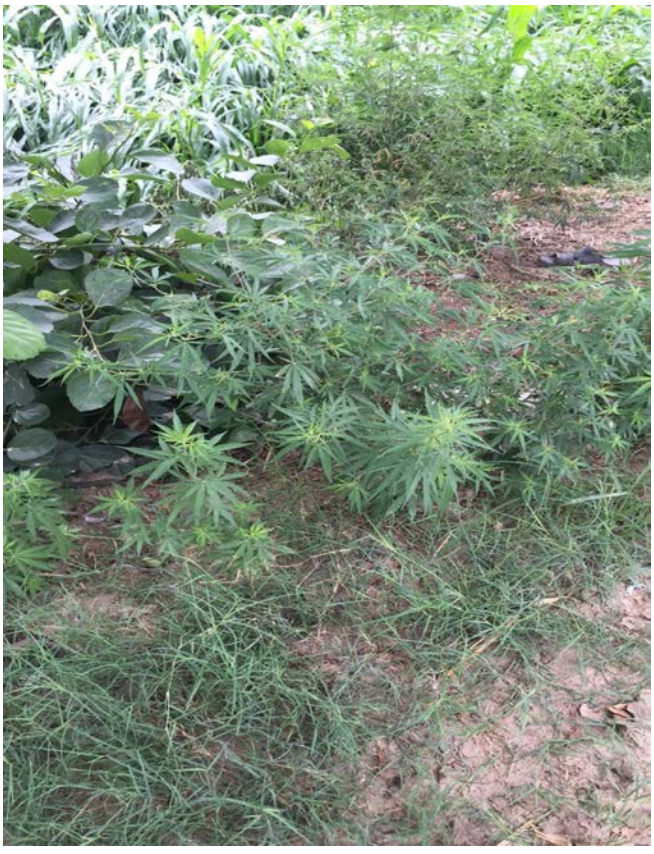
Right: 3-day old calf standing near its mother belonging to one of the villagers in Adhi

Above: Photograph of a four-story villa in Adhi, which is typical for a higher-income family in rural Punjab

Below: Photograph of a typical low-income family home in rural Punjab

Left: Photograph of the main (of three) Sikh temple in Adhi

Below: wild cannabis plant growing on the side of one of the three main dirt roads in Adhi. Cannabis can be used in a variety of herbal remedies.



Literature Review

The World Health Organization (WHO) estimates that 80% of the world's population still practices traditional forms of medicine, native to various cultures. Folk medicine is largely practiced in the developing countries, and especially in the rural areas; however, preparation, use, or even simply having knowledge of folk medicine and local medicinal remedies seem to be declining from the previous generations to the next. Westernization is an ongoing phenomenon around the world. Western ideologies are rapidly spreading to non-western countries and oftentimes the West (the Global North) is viewed as the standard model for development that developing nations (the Global South) should follow and adopt. The primary forces behind this phenomenon are the formation of a global economy during colonialism, as well as the current neocolonialism, and the increasing flows of information, people, and goods worldwide due to globalization. Flows of information are usually seen as occurring from the Global North to the Global South. Additionally, Walter Rostow's *Modernization Theory* defines development from traditional society to modern society as a five-step economic process: Traditional Society, Pre-conditions to Take-off, Take-off, Drive to Maturity, and Age of Mass Consumption. Rostow modeled the process after the Western European reality in the 19th century directly after the Industrial Revolution. With Western Europe set as the standard to follow, many nations have attempted to achieve development by imitating the five steps of European development. Although many, including myself, do not support this rigid, unidirectional concept of global development, this mindset has certainly impacted local populations in developing nations.

According to Frantz Fanon (1968), the Europeans not only exploited land, but also "colonized the minds" of the native populations by dehumanizing them and psychologically making them believe they are inferior to western society and practices. This mentality has continued throughout successive generations. With the formation of an inferiority complex, native populations in ex-colonies are increasingly adopting western ideas and have come to believe of the west as the standard for any type of development. The theory presented in Fanon's work is too complex, however, and cannot entirely account for the westernization and modernization taking place in India. The homogenization of culture around the world and adoption of western culture in developing nations can be due to reasons other than those argued by Fanon. The trend of decreased focus on local medicinal practices could also happen without the experience of colonization. For example, Ethiopia was never colonized, yet many Ethiopians have incorporated elements of western culture into their lifestyles.

The phenomenon of westernization and Fanon's theory sparked my curiosity and influenced my desire to research current trends in the practice of folk medicine. For my project, I have consulted bodies of literature that seek to understand the effects of the availability of western medicine on the practice of folk medicine in developing nations and the outcomes, as well as the perception of both forms of medicine in developing region populations.

Gold and Clapp's (2011) journal article "Negotiating health and identity: lay healing, medicinal plants, and indigenous healthscapes in highland Peru," sheds light on the influence of western medicine and modernization on a small village in the highlands of Peru given the name "Anawi". The authors discuss the principles behind perception and subsequent exercise of various forms of medicine by people, collectively termed a

"healthscape", and how a healthscape is formed. The components of a healthscape include an individual's perception of medical resources and institutions, and the associated costs and accessibility. Their study demonstrates a counteractive response to biomedicine such that a revitalization of folk medicine is occurring in the village. The authors assert that there are six reasons for why villagers use medicinal plants before going to a clinic: "Medicinal plants are described as stronger and more effective than pharmaceuticals, as geographically accessible and affordable, and as traditional and natural; those that use medicinal plants are culturally appropriate […] and finally, those that use them believe plants to be more appropriate for certain illnesses […]" (Gold & Clapp, 2011, p. 98).

This article is important for my research because although an anti-globalization movement is observed among the villagers, a "loss of indigenous medical knowledge" (Gold & Clapp, 2011, p. 103) is still observed. Gold and Clapp argue that education, proximity to an urban center, and wealth have an inverse relationship with the amount of indigenous medical knowledge a person has, while age shares a direct relationship with the amount of known indigenous medicine. Thus, I explored similar correlations in Adhi, Punjab.

In his article "Role adaptation: Traditional curers under the impact of Western medicine," Landy (1974) discusses the acculturation of traditional medical curers and the role adaptation that consequently transpires. He argues that traditional healers must accept western technology and philosophies in order to keep their role in society as curers, thereby causing the role of the curer in society to diminish and an integration of local and modern beliefs to occur.

Landy (1974) references several studies to support his theory of role adaptation and acculturation such as Gould's study of Sherapur, a village in North India, from which

Gould reasoned that villagers perceived western medicine as superior due to the technology with which it is associated. The villagers, however, did not have an understanding of scientific medicine, but rather found its technology practical. Gould discusses "folk pragmatism" as the governing force behind the shift towards western medicine. Common among many of his studies, Gould also acknowledges the agency of the curers and local healers within the context of hybridization of medicinal practices: "…the traditional healer is seen not merely as [a] passive receptor of modern science and technology, but as [an] incorporating technocultural agent and as creator of new technocultural syntheses. The curing role is not only changed, but resynthesized (108)". A study of the Cherokee by Fogelson, however, shows that western medicine can have a positive effect on the survival of indigenous medicine. As assimilation of Native Americans was sweeping across the U.S. in the 19th century, the threat of cultural extinction pushed the Cherokee to use their language as "a conserving force[…] afford[ing] the conjurer a means of transcribing sacred formulas formerly transmitted orally[…]" (Landy, 1974, p. 109). Thus, the threat of westernization produced a preservation effort among the Cherokee.

Landy's article is helpful because it reminded me to keep an open mind. There are many possible outcomes of my research; I may find that villagers choose western medicine over folk medicine because of a perceived credibility of technology, that western medicine has caused an anti-globalization movement and reversion to traditional healing methods, or a variety of other results.

Piron et al. (2000), in their article "Consumers' perceptions of Chinese vs. Western medicine," focus on discerning the perceptions of Traditional Chinese Medicine (TCM) and

western medicine, and exploring which of the two is preferred. The authors discuss the concept of "dual utilization" of both forms of medicine as a result of "pragmatic acculturation", variation in accessibility of health care, and the individual's perception of efficacy.

Of the four hypotheses tested during the authors' research in Singapore, two are relevant to my research project. The first hypothesis was: "older consumers will rate TCM physicians' expertise higher than will younger consumers" (Piron et al., 2000, p. 128). The second hypothesis was: "Consumers brought up in a Chinese language stream of education will display a more positive perception of TCM physicians' expertise than consumers brought up in an English language stream of education" (Piron et al., 2000, p. 128). Both of these hypotheses were accepted based on statistical analysis of the collected data.

The article is significant for my research because the hypotheses are similar to the angles of westernization I tested in Adhi through surveys, in order to have a statistical component to my research. These confirmed hypotheses also demonstrate the impact of westernization in other realms of society, in this case education, and how that can impact the survival of knowledge of local herbal remedies.

In the following article by T.P. Lam (2001), "Strengths and weaknesses of Traditional Chinese Medicine and Western Medicine in the eyes of some Hong Kong Chinese," attitudes of Hong Kong Chinese towards TCM and biomedicine are explored. The author provides that support for western medicine stems from the period of British sphere of influence and from government support and formal recognition of western medicine; thus, allowing for the greater development of biomedicine within Hong Kong. The study conducted by the author, Lam (2001), suggests that western medicine is favored over TCM.

TCM has been reduced to treat mild illnesses and serves as a supplement to western treatments. Many patients also find TCM to be inconvenient because of the time required to prepare herbs and other necessary ingredients for the traditional remedies. Seen as an opportunity cost, many prefer to use pre-manufactured pills prescribed by physicians.

This article is important for my research because it demonstrates that governments and past imperial influences can have a great effect on the practice of medicine within a region, as well as basic practicality, similar to the concept of "pragmatic acculturation" used by Piron et al. (2000). Since the British colonized India and the federal government largely favors western medicine, similar effects may be present in Adhi.

Traditional healing: New science or new colonialism? is a book containing a compilation of essays on the subject of the critique of medical anthropology under the scope of Africa. Written by McClain (1979), the essay "The impact of colonialism on African cultural heritage with special reference to the practice of herbalism in Nigeria" discusses the adverse impacts of the British imperial rule in Nigeria and of the colonial powers in African countries in general. The author accredits the loss of culture and the decrease in practice of folk medicine to the assimilative policies of the British colonial administration.

McClain (1979) argues that herbal medicine was seen as a unifying aspect of African societies, so in an attempt to divide and conquer the continent, European powers attempted to eradicate their colonies of folk medicine and other indigenous culture. Christian medical missionaries carried out this process by forcing western medicine onto the indigenous populations. McClain's critical essay is relevant to my research project because it discusses the direct impact of westernization and the lasting effects of colonialism. The British colonized India as well and globalization manifested itself in the

same forceful manner. Although India is an independent nation, its history as a colony could be a large component of a decline or revitalization of local herbal medicine.

Similarly, in chapter 10 of *Biomedical hegemony in the context of medical pluralism*, Baer et al. (2013) propose biomedicine as an instrument used by western colonial powers "to maintain control of exploited populations" (p. 210). They argue that biomedicine is the dominant medical system in the world and continues to assert its dominance over other forms of medicine; western medicine is becoming the standard of the world. The authors date the rise of biomedicine back to the imperialism in Africa in the late 19th century. As colonial figures began traveling and occasionally settling in the African colonies, medical missionaries erected clinics for health care provision to the European populations; however, soon thereafter colonial powers began controlling health care in entire colonies, but health care services were still limited to Europeans and privileged Africans. It was not until the mid 1900s that western medicine infiltrated rural areas and via indirect rule (native individuals appointed by colonial power to rule over populations using colonial ideals and policies), local indigenous leaders began replacing folk medicine with biomedicine.

Baer et al.'s chapter is significant because it highlights the interactions between Britain and its ex-colonies. The British have influenced many Indian policies and even brought the Parliamentary Democracy political system to India. Their presence in India may therefore have led to the acceptance of modern medicine by the government and more recently by many citizens as well.

Indigenous and Western medicine in colonial India, a book written by Madhuri Sharma (2012), seeks to understand the practice of folk medicine in the region of Banaras

(a.k.a. Benares/Varanasi) during colonialism and how the practice of medicine shifted towards modern medicine under British rule. In Chapter 1, "Health and Healing Practices in Banaras: Patterns of Patronage", Sharma argues that a decline in indigenous medicine occurs due to exposure to colonial western medicine. She argues that during the 19th and 20th century, many municipalities, political leaders, bureaucrats, and other influential people advocated for the adoption of modern medicine. A state initiative to spread western medicine across the colony was formed; scholarships were established for education in biomedicine, jobs in areas of infrastructure and management of clinics and hospitals were created, and women working in factories in Uttar Pradesh were entitled to a five rupee bonus if they employed services of a professional midwife or health advisor.

Sharma's chapter particularly resonates with my research because it provides a basis for the change in perception of medicine that led to the decline of the practice of indigenous medicine. The preference for modern medicine began in the late 19th century and has significantly spread since its arrival in India.

In the article, "Folk herbal medicines from tribal area of Rajasthan, India," Katewa et al. (2004) focus on the various plants used for herbal remedies by the tribesmen and tribeswomen of the Mewar region. The authors conducted a case study to collect data on the plant types and their uses, while also collecting demographic data on the current use of folk medicine by the villagers. The data suggests that villagers above the age of 60 were most knowledgeable about herbal remedies, and the researchers attribute this to modernization and the tendency of younger generations to sway away from traditional lifestyles. Another reason is a growing scarcity of plants used in the herbal medicine due to environmental issues such as overgrazing, deforestation, and droughts.

This article is important for my research because in addition to exploring a potential decreased demonstration of ethnobotanical knowledge, I collected data on the folk medicine practiced by the villagers in Adhi similar to the data collected in this study by Katewa et al.: What herbs and plants are being used, and for what purposes? Demographic data is also crucial for my research in order to identify any decline in possession of knowledge among generations.

The article, "Indigenous knowledge of medical plants used by Saperas community of Khetawas, Jhajjar District, Haryana, India" is based on a case study that aims to understand what plants are used by the Saperas and why (Panghal et al., 2010). The Saperas are an indigenous snake charmer community and hold a multitude of knowledge on the treatment of snakebites using herbal remedies. The study revealed a decrease in knowledge of the folk medicine with successive generations. Panghal et al. (2010, p.6), concluded that "knowledge is dwindling rapidly due to changes towards a more western lifestyle, modern agricultural practices, cultural changes within the community, rapid shift towards allopathic medicine, housing colonies, and modern education". This article further highlights the demise of herbal folk medicine in rural villages of India. It is thus important for my thesis because Adhi is likely to be facing many of the issues raised in this article such as a rapid shift towards biomedicine due to the rapid urbanization and development India is currently undergoing.

"Long-Term (Secular) change of ethnobotanical knowledge of useful plants: Separating cohort and age effects," a study of the Tsimane of Bolivian Amazonia by Godoy et al. (2009), focuses on distinguishing between inadmissible indigenous knowledge and that which can be used to correctly determine if a loss of ethnobotanical indigenous

knowledge is occurring in a community. The difference emerges from knowledge that is associated with various stages of life (motherhood, adolescence, etc.) and cannot be learned during earlier stages, known collectively as the age effect, and knowledge that can be learned and utilized at any stage of life, which is known as the cohort effect. While earlier studies show that indigenous knowledge is declining due to education, occupation, market exposure, and acculturation, data collected for those studies were to some extent invalid because they fall under the age effect and cannot be tested without age bias across generations. Thus, Godoy et al. (2009) conducted their study using a discipline of knowledge common to all ages: ethnobotanical knowledge. Previous research supports that ethnobotanical knowledge is acquired during the late teenager years and is sustained throughout life if populations continue to practice it.

This article is important for my research because it alerted me to a common error committed when conducting studies on the fading of indigenous knowledge. I became aware I had to avoid having any type of age effects in my study. The article thereby helped to ensure that my data on the practice and knowledge of herbal medicine would be admissible.

Methodology

I will be using the terms *local remedies, folk medicine, herbal remedies, home remedies, and ethnobotanical knowledge* interchangeably as they are synonymous to one another under the context of my research. The term ethnobotanical knowledge, used by Godoy et al., is defined as the knowledge of the use of plants (including herbs, spices, roots, extracts, and oils) specific to a particular culture. Measuring a decrease in demonstration of

cultural knowledge can be subject to systematic error due to non-representative samples. Such error stems from the age effect: knowledge that can only be acquired during various stages of life (i.e. parenthood). In order to quantify the diminished demonstration and use of knowledge, the type of knowledge measured must be common to all ages. Ethnobotanical knowledge falls under the cohort effect, which means it is knowledge than can be learned at any age and retained throughout a lifetime. I consulted the study by Godoy et al., Long-Term (Secular) Change of Ethnobotanical Knowledge of Useful Plants: Separating Cohort and Age Effects, during my research to follow proper guidelines for data collection of ethnobotanical knowledge.

Data collection proceeded in the form of a cohort study, which was conducted with two formal written surveys and an informal interview component. Researchers must obtain informed consent of participants before enrolling them into the study and the names and identities of participants must remain anonymous (Dowling, 2009). So, participants were enrolled in the study after the purpose of my research and the terms of enrollment were verbally explained to them and informed consent was gained. Participants were only identified by the number on the survey that was distributed to them. Data were qualitative and quantitative, which allowed for demographics and statistical relationships, as well as opinions, experiences, and behaviors to be explored and used to thoroughly answer my research question. In my cohort study, I compared the relationship and correlation between age, gender, level of literacy, and education, and the amount of knowledge of herbal medicine demonstrated by the sample population. Triangulation, the combination of various research and data collection methods, allowed for multi-method research, which broadens the type of information gathered (McKendrick, 2009). In multi-method research,

each method "generates particular data, which when brought together are complementary and can broaden the understanding of the issue at hand by enriching, expanding, clarifying, or illustrating" (McKendrick, 2009, p. 130). Multi-method research is often employed by geographers—a fact that inspired me to employ it in this study.

The surveys and interviews were conducted with participants of each age group (see below) and gender. The formal surveys (see Appendix 2, 3, and 4) served to collect demographic data, as well as a method to create a database of well-known useful herbs, plants, and spices used in the local folk remedies. 10 elements were chosen at random from this database of ethnobotanical knowledge to create a secondary survey to test the same population on their knowledge of herbal remedies. This secondary survey was designed to provide quantitative data for analysis of the decline in possession and use of ethnobotanical knowledge. Statistical analyses of the data gathered from the formal surveys were conducted using the SPSS statistics software.

The sample size is 50 people (n = 50), 50 percent male, 50 percent female, and there are between 5-10 people per age cohort. Ethnobotanical knowledge is generally acquired during the late teenage years. Thus, subjects were at least 18 years of age in order to participate in this case study. The age of the oldest participant in my study is 90 years. Age cohorts are divided as follows: Cohort 1 = 18 to 25 years, cohort 2 = 26 to 41 years, cohort 3 = 42 to 57 years, cohort 4 = 58 to 73 years, and cohort 5 = 74 to 90 years. Due to the limitation of qualifying participants based on age, the study did not allow for unbiased and random sampling. The sample population was not representative of the entire village because residents below the age of 18 were excluded from the study. Thus, I distributed surveys by going door-to-door (excluding household members that did not meet the

minimum age requirement); however, the roads on which I walked from house to house were selected by Harjeet. They were the roads and homes of people with whom she was most comfortable in introducing me. This was a barrier I faced due to my research being cross-cultural. Since Harjeet was my intermediate figure and link to the rest of the villagers, I was expected to respect her level of comfort and allow her to guide me through the village as she pleased. Additionally, I was only in Adhi for four weeks, introducing a time-constraint factor. I could not sample every household in the village because it would require more than four weeks to conduct primary surveys, secondary surveys, and informal interviews with all qualifying participants, hence I collected data based on convenience sampling and was unable to sample the population randomly.

The informal interviews were structured as a six-question guided conversation (see Appendix 1) that were supposed to be conducted with participants and used for qualitative analysis of the practice of folk medicine in Adhi. This type of interview is known as semi-structured interviews. Semi-structured interviews are commonly used by geographers to conduct research because unlike structured surveys or interviews, information regarding emotions, behaviors, experiences, and opinions can be collected (Longhurst, 2009, p. 583). Semi-structured interviews additionally create a heightened sense of respect for participants by giving them a degree of autonomy during conversations. Thus, information on the perception, preference, and practice of herbal medicine versus western medicine was gathered from villagers in Adhi. While in Adhi, however, the informal interviews did not take shape of the guided conversation I had in mind when designing the interview questions. I encountered some problems with conducting the interviews as planned because many of the villagers would extend or change conversations or simply not

properly answer my questions. It was hard to follow a guided conversation because each conversation took a different route. The data I collected, however, are sufficient to answer my research question and provided much insight into the perceptions of the villagers regarding local herbal remedies and western medicine.

During the formal and informal interviews, Harjeet introduced me to the villagers, and made sure there was no miscommunication as I was interacting with the subjects of my study. Interactions with the local villagers was fairly unchallenged; however, there were several instances when there were misinterpretations and miscommunication between me and the villagers due to the difference in spoken dialects and meanings of specific words in Punjabi spoken in Punjab and the Punjabi spoken in the United States. During these moments, I utilized the help of Harjeet to clarify what I was intending to ask the subjects of the study. She also helped distribute the formal surveys and when we encountered illiterate participants, she or I translated the questions for them. Harjeet also aided me in finding the subjects again for when I conducted the secondary surveys and informal interviews.

Upon my return from Adhi, I created a reference guide for the ethnobotanical knowledge I documented during my stay in Adhi. With the help of my grandparents, Narendra and Kanwaljeet Sekhon, my parents, Vikramjit and Sweetie Anand, my aunt and uncle, Onkar and Ranjit Sekhon, and my cousin Jaissy Sekhon, I was able to translate the names of the plants and various ingredients from Punjabi to English. My family gathered on both ends of the phone and through an extensive phone conversation that lasted several hours, we were able to catalog the names of all the ingredients for the remedies I had learned from the residents of Adhi (see Appendix 5).

Procedure for Quantitative Analysis

SPSS is a statistical analysis software program that allows the user to run various statistical analyses upon a dataset or multiple datasets. Due to my statistical background being limited to basic knowledge, I employed the use of several tutorial videos and articles to ensure the analyses I conducted were accurate and relevant. The article titled "Descriptive Stats for One Numeric Variable (Explore)" (2016) available on the Kent State University website discusses several statistical tests for analyzing and interpreting single numeric variables. The article demonstrates the importance of running descriptive statistics functions on such data and how to interpret the results including: boxplots, normality tests and factors, and kurtosis. Included in the discussion is the step-by-step tutorial for executing the descriptive statistics analysis in SPSS.

The information Kent State University has provided on their website is important to my research project and the analysis I conducted upon the data I gathered in Adhi. I referenced this article while using SPSS to ensure I conducted the correct tests and analyses on one numeric variable data. Furthermore, the article aided me in properly interpreting the collected data for my research.

"When to Use a Nonparametric Test" (2016) is an article available on the Boston University School of Public Health website. The article discusses when to use parametric analysis versus nonparametric analysis when conducting statistical analysis of particular data. According to the article, parametric tests should be used when data exhibit normal distribution, while nonparametric tests should be used for ordinal data and data that are not normally distributed.

This article was significant for the quantitative analysis section of my research project because it enhanced my understanding of the type of data I collected and which tests are appropriate for subsequent data analysis. I used "When to Use a Nonparametric Test" (2016) as a guideline for choosing the correct type of analysis, parametric versus nonparametric, for each of the variables I tested. Although the article only provides basic information of nonparametric tests, it still improved my knowledge and understanding of nonparametric data and analysis.

The following video file can be found on the Oxford Academic (Oxford University Press) (2015) YouTube channel: Nonparametric tests (SPSS). This video clip demonstrates how to execute one sample nonparametric tests and analysis. The tutorial goes in depth about nonparametric testing for normality of scale variable data. Furthermore, the narrator discusses how to interpret test results and how to apply one's findings to define the data.

The Oxford Academic (Oxford University Press) (2015) video was helpful for my research because it provided me with information on additional and more advanced tests of normality I could use to establish normality or lack thereof in my collected data. Although it was not essential to conduct these tests on my data, the video is a helpful source to reference should I need to provide supplementary evidence to support normality tests I conducted.

Another resourceful YouTube channel helpful to my analysis is: TheRMUoHP Biostatistics Resource Channel. Rocky Mountain University Biostatistics department created this YouTube channel. Professors of statistics upload video tutorials and lectures to the channel for students around the world to watch and gain a better understanding of various statistical concepts and analyses.

Two videos in particular that I found helpful were titled “How to Use SPSS: Choosing the Appropriate Statistical Test” (TheRMUoHP Biostatistics Resource Channel, 2013) and “How To Use SPSS - Spearman Correlation Coefficient” (TheRMUoHP Biostatistics Resource Channel, 2012). These tutorials provide viewers with information and knowledge of functions available to a researcher within SPSS and how to use them. The video, “How to Use SPSS: Choosing the Appropriate Statistical Test” (TheRMUoHP Biostatistics Resource Channel, 2012), presents guidelines for preparing and executing a research project, and conducting appropriate analysis of data is discussed. The second video, “How To Use SPSS - Spearman Correlation Coefficient” (TheRMUoHP Biostatistics Resource Channel, 2012), briefly discusses the importance of the nonparametric Spearman correlation test and provides a step-by-step tutorial of how to run a Spearman correlation on nonparametric data.

Both of these videos were extremely helpful for the quantitative analysis of my research data. I referenced both videos and followed the guidelines and steps outlined in each video in order to thoroughly understand what types of data I had collected and how to analyze them, and once I differentiated between parametric and nonparametric data, how to run Spearman correlation tests and interpret them.

In order to validate the findings of my research, I plan to add a longitudinal component to it: I will return to Adhi in 2025 and conduct this study again. I will not use all the same participants for my sample because the population that was under the age of 18 in 2015 will be eligible to participate in my study in 2025. I will need to include this newly aged population in order to compare differences in the amount of ethnobotanical

knowledge known among the newly aged group with the knowledge of all other age cohorts sampled in 2025 as well as the same age cohort sampled in 2015.

After spending 4 weeks in Adhi, I felt I had completed all fieldwork necessary to write an honors thesis regarding my hypothesis. In this thesis, I will discuss the results of my quantitative and qualitative research and the significance they hold with regards to rejecting or accepting the null hypothesis. The null hypothesis is: there is no decline in the use, practice, and preparation of ethnobotanical knowledge and remedies occurring in the village of Adhi.

Quantitative Data Analysis

Quantitative data for this study was gathered using two formal survey instruments. Each survey was printed in Punjabi. Many participants were illiterate. For these villagers, Harjeet Nahal or I read the questions aloud and filled out the surveys according to their answers. Literate participants filled out surveys on their own and returned the completed forms to me. The primary survey instrument included 10 questions. The first eight questions served to collect demographic data of the population such as gender, age, literacy, type and level of education, occupation, yearly income, and distance from nearest doctor and hospital. The final two questions asked participants to rate the effectiveness of western medications versus folk remedies and to provide a list of the known uses of as many plants, spices, and herbs as possible in regards to human health and wellbeing. The following question from the primary survey was not used in data analysis: If you attended school, what type of school was it? (Punjabi Medium, Hindi Medium, or English Medium). Participants who attended a school (at any point during their lifetime) all answered

"Punjabi Medium" to this question. The data collected from this question were intended to explore a possible correlation between language of education and demonstration of ethnobotanical knowledge. Due to the answers being the same among participants that attended school, the question no longer served any significant statistical purpose in my study.

The secondary survey instrument consisted of 10 multiple choice questions regarding the function of specific plants, spices, and herbs. The questions were constructed using the ethnobotanical knowledge provided in the primary survey. 10 remedies of the 54 listed by the villagers were selected at random, in order to eliminate difficulty bias, as some remedies were commonly known, while others were only recorded by single participants. Scores represent the amount of local medicinal knowledge known by participants.

The total number of participants in the study is 53, comprised of 28 females and 25 males. Samples were collected by walking door to door around the village and asking residents if they would like to participate in my study. Residents from various blocks, alleys, and roads of the village were included; however, due to the cross-cultural settings, I was expected to only conduct the study on the roads and in allies in which Harjeet felt comfortable taking me and introducing me to the residents. In addition to the cross-cultural restrictions on sampling population I faced during data collection, an intrinsic exclusion criterion in this study is that participants had to be 18 years of age or older in order to be enrolled in the study due to the *Cohort Effect* discussed earlier. The target sample size was n = 50, thus, once I had successfully distributed approximately 50 surveys, I stopped sampling the population. Data collection followed a convenience sampling model, rather than random sampling. Since random sampling did not occur, the proceeding

analyses cannot be generalized to the entire village; statistical analyses are only representative of the sample population (n, where n = people enrolled in the study) and only provide information on patterns and trends among the sample population. For this reason, statistical analyses were conducted assuming n = N, where the sample population (n) is equal to the whole population (N). Additionally,

The data collected from participants #3, #9, and #20 are not used in the statistical analysis due to invalidity of the secondary surveys. Quantitative data from participant #3 were invalid due to her involvement in the study as an aid and guide in Adhi. Although during the initial phase of the study, in which the primary surveys were distributed, participant #3 was a viable candidate, she aided in translations and transcriptions of other participants' answers for question 10 of survey 1, allowing her to gain access to ethnobotanical knowledge she may not have had prior to the study. Quantitative data from participant #9 were unsound because he did not follow directions properly that mandated he cannot discuss the questions of the secondary survey with other participants during the study. His responses to the secondary survey were identical to those of his elder brother, who had previously completed the survey. Participant #20's secondary survey was incomplete as she refused to answer all of the questions.

The total population of Adhi is 1,474 people: 737 males and 737 females. The composition of the participant data used in the statistical analysis is such: n = 50 with 26 females, 24 males, ages ranging from 18 years to 90 years, education level ranging from none to Bachelor of Arts degree, and estimated yearly incomes ranging from 5,000 Rs. to 500,000 Rs. Although the sample size is greater than 30, due to convenience sampling and selection bias, the sample population is not statistically representative of the whole village.

Regardless of the data being non-representative of the entire village, my project still focuses on contributing to academic discourse on the topic of a decline in the demonstration and practice of folk knowledge. My research can serve as a prototype study and model for scholars to use in conducting similar studies.

Originally, I used the survey instruments to also explore the relationship between proximity to a licensed physician and hospital and possession of ethnobotanical knowledge; however, all participants answered the same for the respective question: villagers traveled to the closest city, Nakodar, located approximately 17 km Southwest of Adhi, to visit a licensed physician and the nearest hospital is located approximately 24 km Northeast of Adhi in the major district city of Jalandhar. Thus, there is no analytical value or relationship between the amounts of known folk remedies by a single person and the proximity to healthcare and I have eliminated this factor from my study. Although there is no quantitative evidence in my data that geographic proximity to doctors and hospitals can affect the practice of folk medicine, proximity does not equate to *accessibility*. As discussed later in the qualitative analysis of the perspectives of the villagers regarding home remedies and biomedicine, accessibility to healthcare often becomes the deciding factor in whether to use ethnobotanical remedies or western treatments. Such factors include means of transportation, severity of the illness, and personal views of the efficacy of either form of medicine.

In conjunction with my research question on whether or not there is a diminished demonstration of ethnobotanical knowledge across generations, the quantitative analysis focuses largely on the correlation between score achieved on the secondary survey and the age of the participant, keeping in mind all statistical analyses only hold true under the

assumption that n = N. Subsequent correlational and comparative analysis between scores and Gender, scores and Education (highest completed level), and scores and Income (yearly) serves to reflect possible reasons for the decline in local medicinal knowledge with each successive generation. Parametric and nonparametric statistical analysis suggests that there is a downward trend in the knowledge of herbal home remedies from older generations to

younger generations.

Before I could make any conclusions or inferences based on data analyses, I conducted normality tests on all the data. The following independent variables were tested for normality: Age (years), Age Cohorts, Gender, Education, and Income.

Age Years

Case Processing Summary

	Cases					
	Valid		Missing		Total	
	N	Percent	N	Percent	N	Percent
Age Years	50	100.0%	0	0.0%	50	100.0%

Descriptives

			Statistic	Std. Error
Age Years	Mean		46.56	2.563
	95% Confidence Interval for Mean	Lower Bound	41.41	
		Upper Bound	51.71	
	5% Trimmed Mean		46.01	
	Median		45.00	
	Variance		328.456	
	Std. Deviation		18.123	
	Minimum		18	
	Maximum		90	
	Range		72	
	Interquartile Range		26	
	Skewness		.380	.337
	Kurtosis		-.486	.662

Tests of Normality

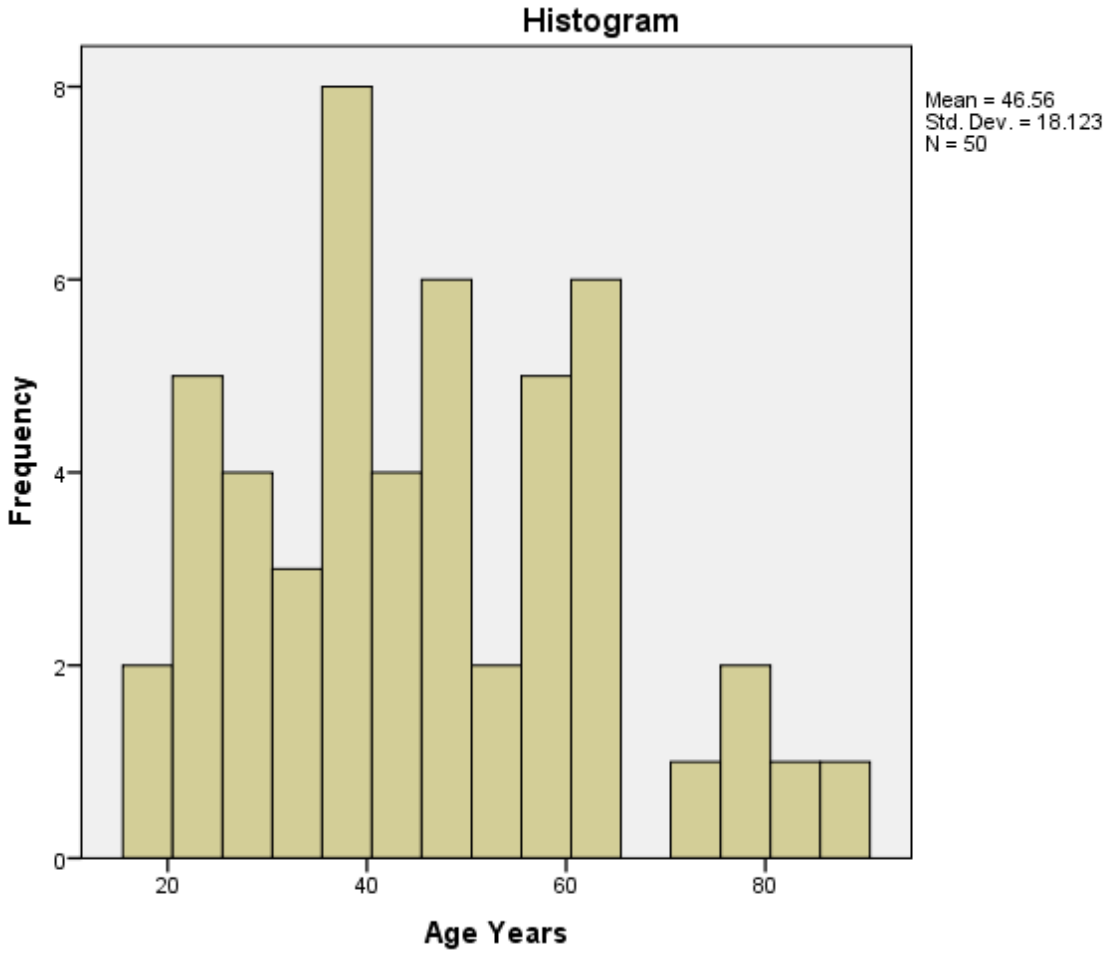
	Kolmogorov-Smirnov[a]			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
Age Years	.081	50	.200*	.967	50	.180

*. This is a lower bound of the true significance.

a. Lilliefors Significance Correction

H_O = The data for Age Years are NOT normally distributed.

H_A = The data for Age Years are normally distributed.



Age Cohorts

Case Processing Summary

	Cases					
	Valid		Missing		Total	
	N	Percent	N	Percent	N	Percent
Age Cohorts	50	100.0%	0	0.0%	50	100.0%

Descriptives

			Statistic	Std. Error
Age Cohorts	Mean		2.80	.171
	95% Confidence Interval for Mean	Lower Bound	2.46	
		Upper Bound	3.14	
	5% Trimmed Mean		2.78	
	Median		3.00	
	Variance		1.469	
	Std. Deviation		1.212	
	Minimum		1	
	Maximum		5	
	Range		4	
	Interquartile Range		2	
	Skewness		.258	.337
	Kurtosis		-.865	.662

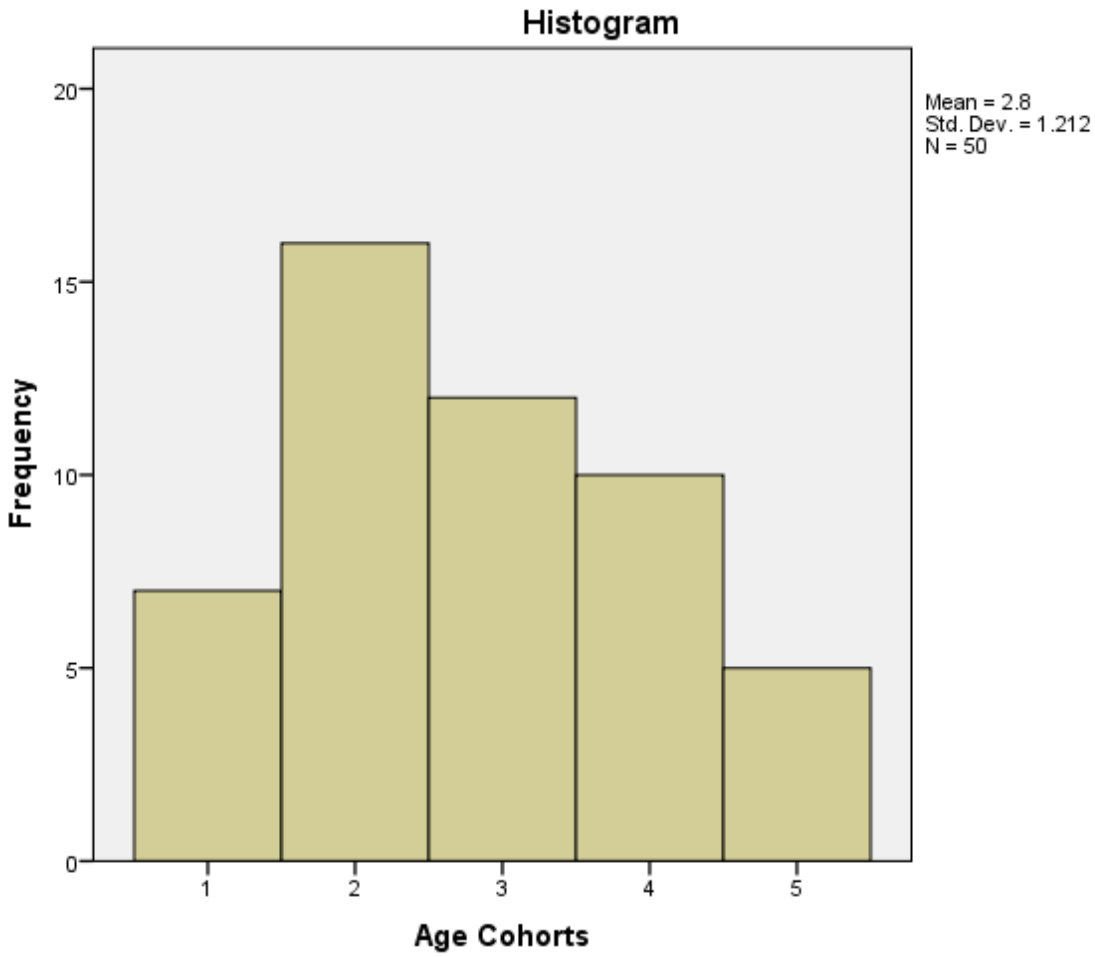
Tests of Normality

	Kolmogorov-Smirnov[a]			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
Age Cohorts	.205	50	.000	.908	50	.001

a. Lilliefors Significance Correction

H_O = The data for Age Cohorts are NOT normally distributed.

H_A = The data for Age Cohorts are normally distributed.



Gender

Case Processing Summary

		Cases					
		Valid		Missing		Total	
	Gender	N	Percent	N	Percent	N	Percent
Score	Female	26	100.0%	0	0.0%	26	100.0%
	Male	24	100.0%	0	0.0%	24	100.0%

Descriptives

	Gender			Statistic	Std. Error
Score	Female	Mean		5.73	.406
		95% Confidence Interval for Mean	Lower Bound	4.89	
			Upper Bound	6.57	
		5% Trimmed Mean		5.70	
		Median		5.50	
		Variance		4.285	
		Std. Deviation		2.070	
		Minimum		2	
		Maximum		10	
		Range		8	
		Interquartile Range		3	
		Skewness		.391	.456
		Kurtosis		-.458	.887
	Male	Mean		4.50	.335
		95% Confidence Interval for Mean	Lower Bound	3.81	
			Upper Bound	5.19	
		5% Trimmed Mean		4.59	
		Median		5.00	
		Variance		2.696	
		Std. Deviation		1.642	
		Minimum		0	
		Maximum		7	
		Range		7	
		Interquartile Range		2	
		Skewness		-.707	.472
		Kurtosis		1.208	.918

Tests of Normality

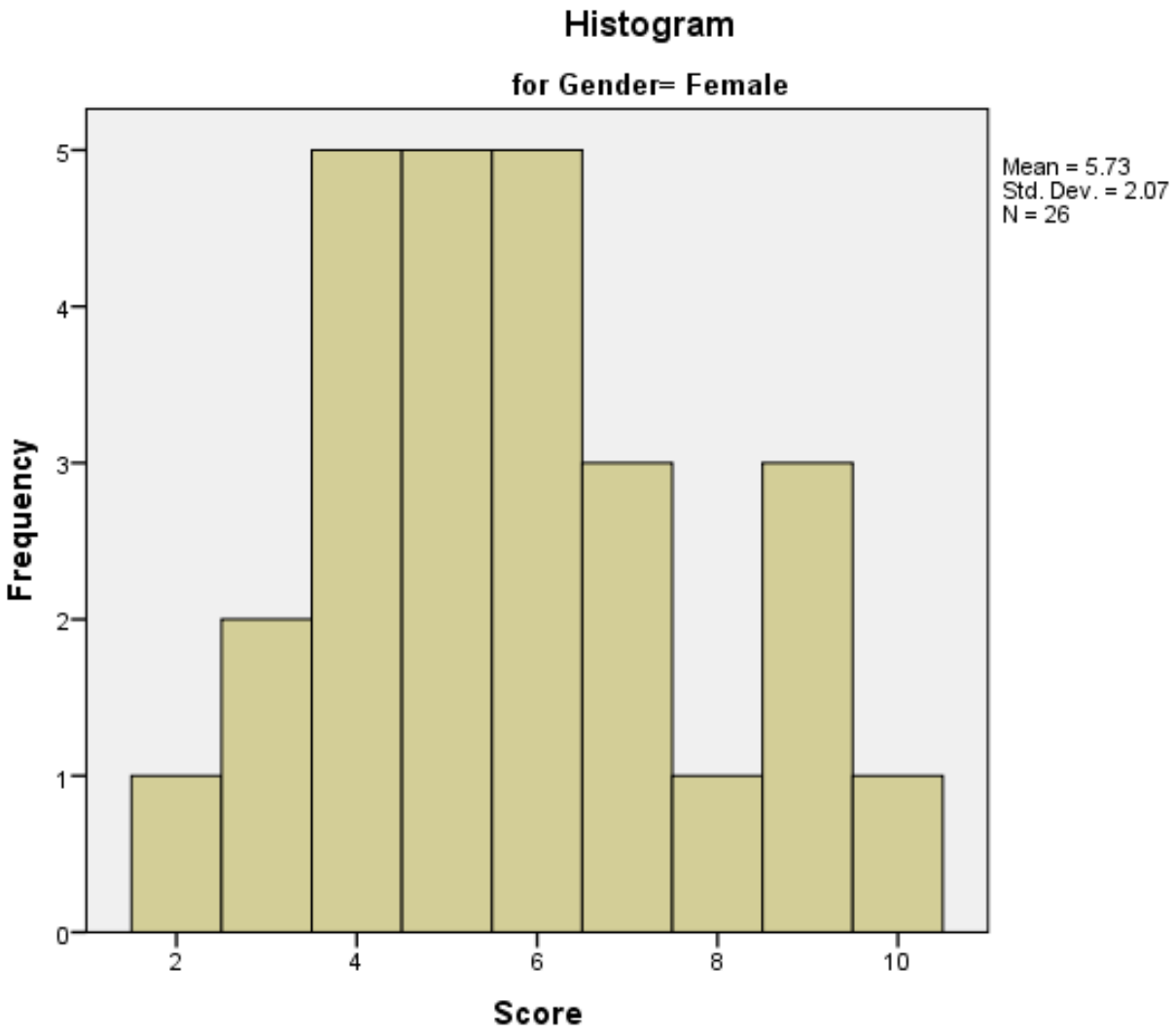
		Kolmogorov-Smirnov[a]			Shapiro-Wilk		
	Gender	Statistic	df	Sig.	Statistic	df	Sig.
Score	Female	.141	26	.200*	.955	26	.311
	Male	.203	24	.012	.922	24	.064

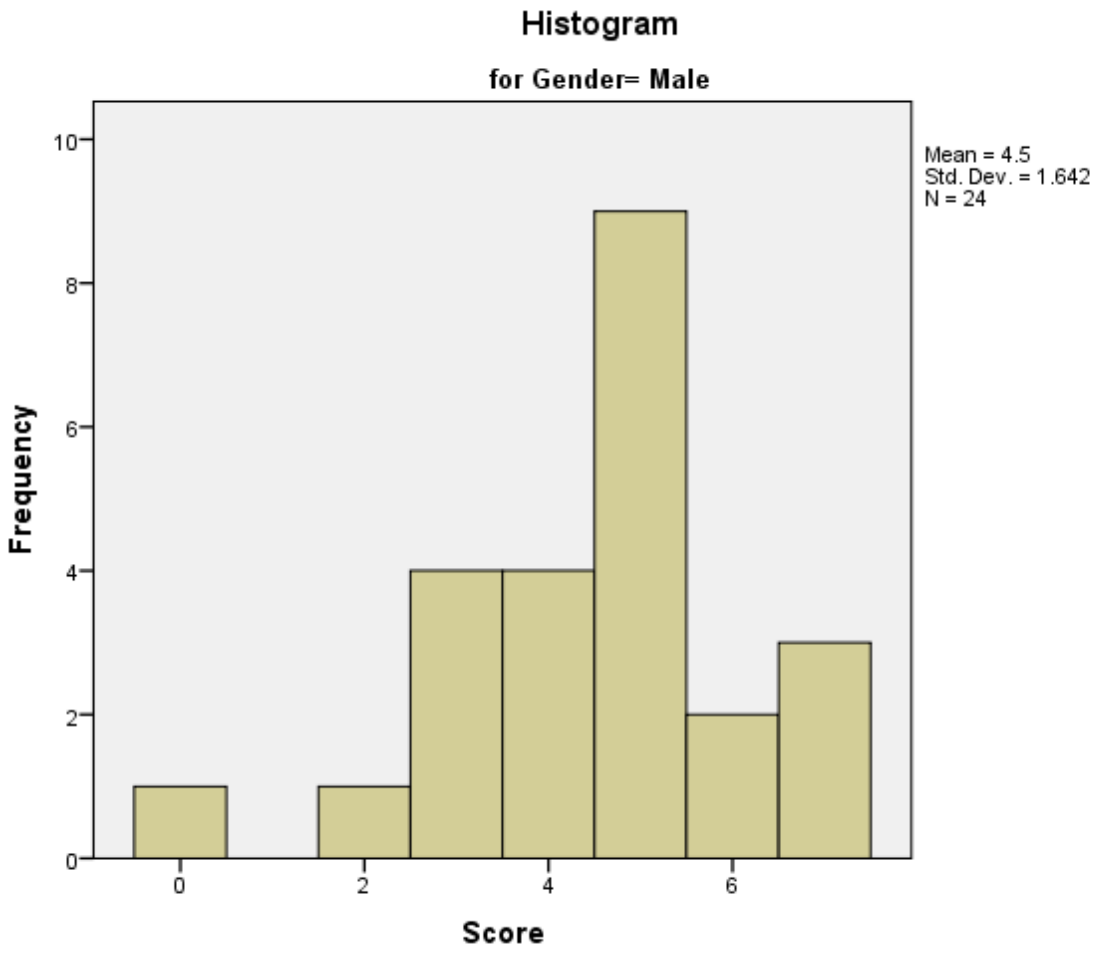
*. This is a lower bound of the true significance.

a. Lilliefors Significance Correction

H_O = The data for Gender are NOT normally distributed.

H_A = The data for Gender are normally distributed.





Test of Homogeneity of Variances

Score

Levene Statistic	df1	df2	Sig.
1.615	1	48	.210

ANOVA

Score

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	18.905	1	18.905	5.366	.025
Within Groups	169.115	48	3.523		
Total	188.020	49			

H_0 = The data for Gender do NOT display equal variance.

H_A = The data for Gender display equal variance.

Education

Case Processing Summary

	Cases					
	Valid		Missing		Total	
	N	Percent	N	Percent	N	Percent
Education	50	100.0%	0	0.0%	50	100.0%

Descriptives

			Statistic	Std. Error
Education	Mean		5.98	.736
	95% Confidence Interval for Mean	Lower Bound	4.50	
		Upper Bound	7.46	
	5% Trimmed Mean		5.89	
	Median		8.00	
	Variance		27.081	
	Std. Deviation		5.204	
	Minimum		0	
	Maximum		16	
	Range		16	
	Interquartile Range		10	
	Skewness		-.036	.337
	Kurtosis		-1.618	.662

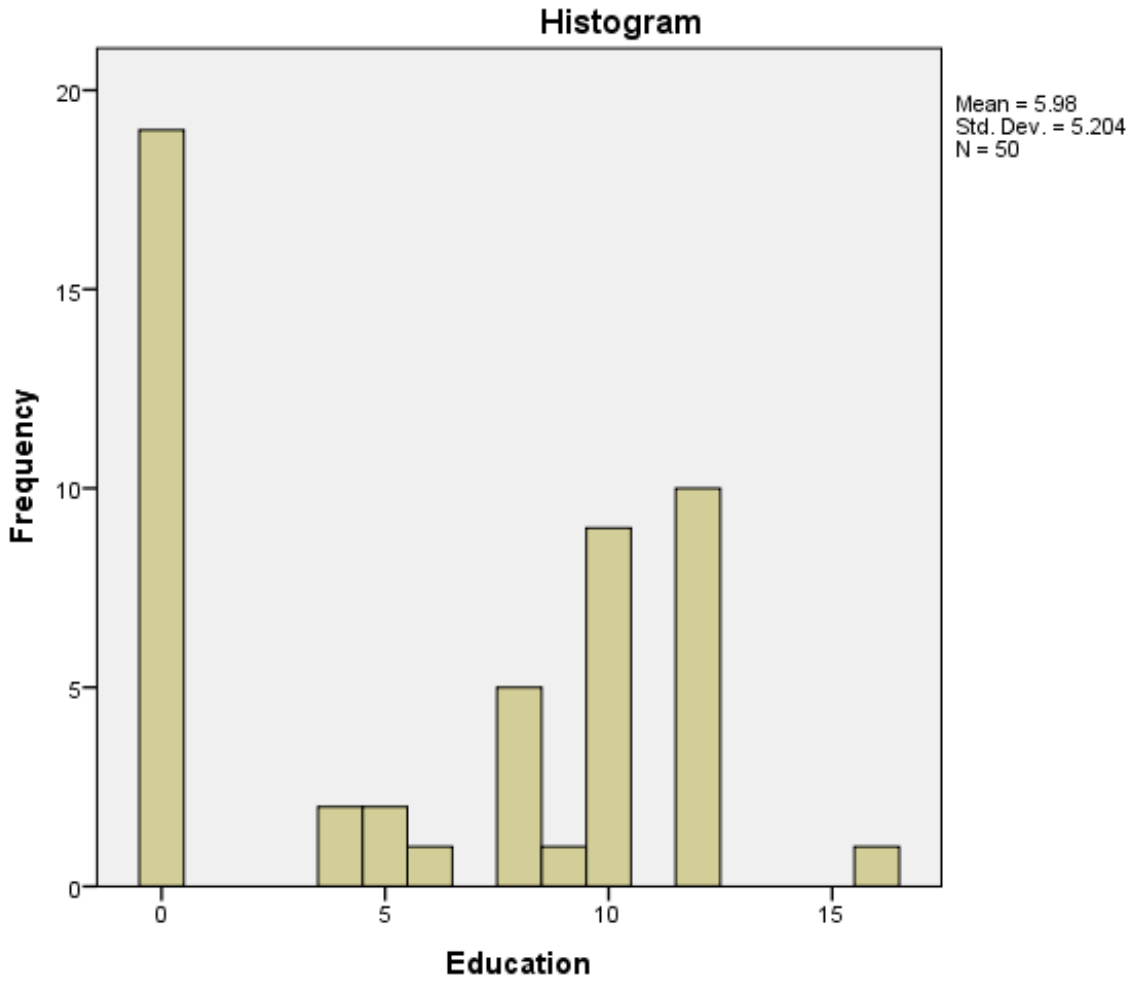
Tests of Normality

	Kolmogorov-Smirnov[a]			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
Education	.255	50	.000	.824	50	.000

a. Lilliefors Significance Correction

H_0 = The data for Education are NOT normally distributed.

H_A = The data for Education are normally distributed.



Income

Case Processing Summary

	Cases					
	Valid		Missing		Total	
	N	Percent	N	Percent	N	Percent
Income	50	100.0%	0	0.0%	50	100.0%

Descriptives

			Statistic	Std. Error
Income	Mean		81960.00	15648.850
	95% Confidence Interval for Mean	Lower Bound	50512.46	
		Upper Bound	113407.54	
	5% Trimmed Mean		67455.56	
	Median		25000.00	
	Variance		12244324897.959	
	Std. Deviation		110654.078	
	Minimum		5000	
	Maximum		500000	
	Range		495000	
	Interquartile Range		86250	
	Skewness		2.089	.337
	Kurtosis		4.313	.662

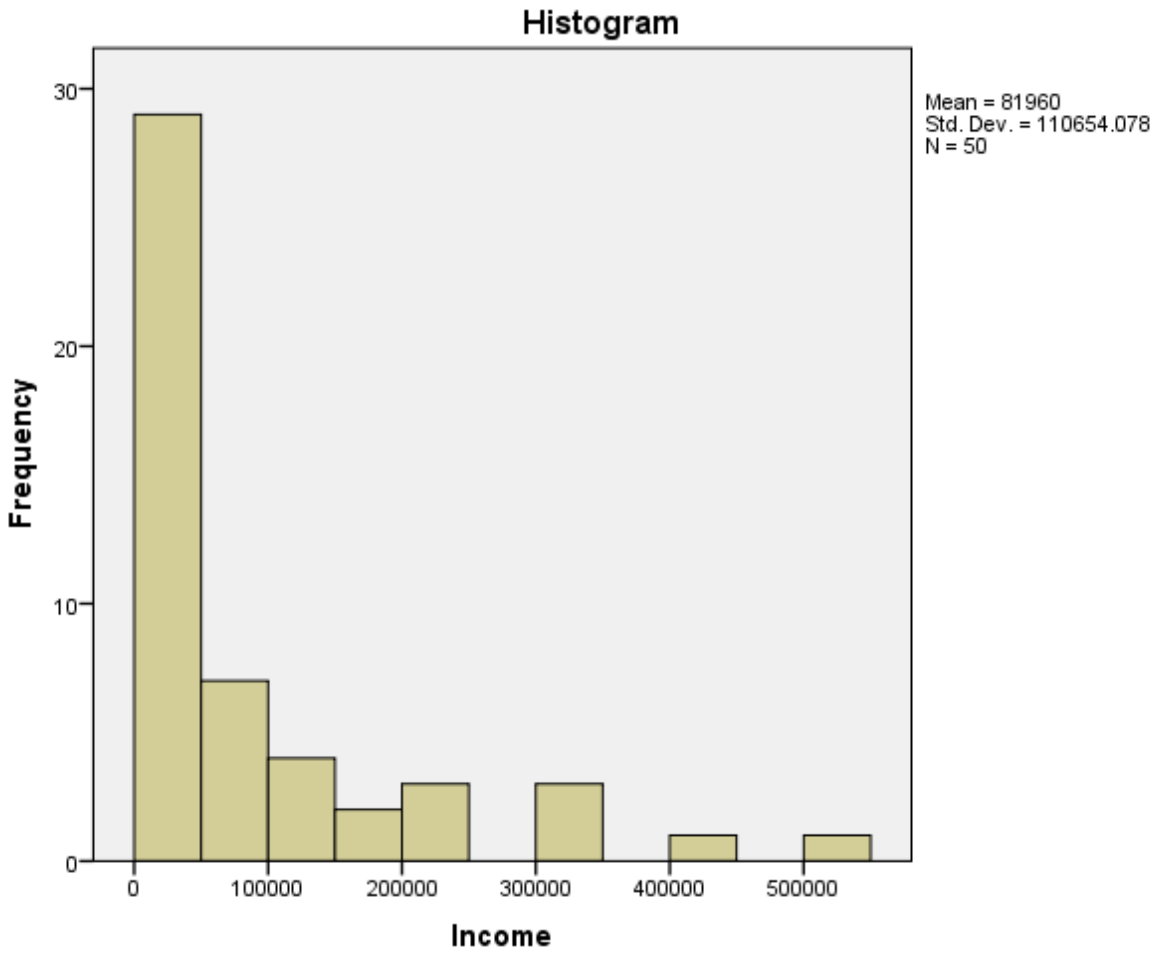
Tests of Normality

	Kolmogorov-Smirnov[a]			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
Income	.243	50	.000	.704	50	.000

a. Lilliefors Significance Correction

H_0 = The data for Income are NOT normally distributed.

H_A = The data for Income are normally distributed.



According to the procedures outlined for normality testing in the Kent State University article, “Descriptive Stats for One Numeric Variable (Explore)” (2016), these Shapiro-Wilk statistic tests of normality exhibit that only Age Years and Gender demonstrated normal data distribution. Age Cohorts, Education, and Income did not present normal distributions. The significance value of Shapiro-Wilk statistic tests for Age Years and for Gender (for both female and male data) is greater than 0.01, rejecting the null hypothesis and confirming that the data follow a normal distribution. In addition to normal distribution, the Levene test and one-way Analysis of Variance (ANOVA) of Gender data revealed equal variance of scores for Knowledge between females and males because $p > 0.01$ for the Levene statistic

and $p < 0.05$ for the F-Value. The significance values of the Shapiro-Wilk statistic test for Age Cohorts, Education, and Income are less than 0.01; the null hypothesis is accepted, suggesting that the data from these three variables do not follow a normal distribution. Thus, parametric methods (Pearson correlation test and Regression analysis) were performed using Age (years) and Knowledge, as well as Gender and Knowledge (Independent t-test). Relationships between Age Cohorts, Education, Income, and Knowledge must be tested using nonparametric techniques (Spearman correlation test).

Knowledge (scores) is the dependent variable in this study. Before examining which independent variables may or may not have affected the results, some descriptive statistics were prepared to observe general trends in the scores of the villagers on the secondary surveys:

Knowledge

Statistics

Score

N	Valid	50
	Missing	0
Mean		5.14
Median		5.00
Mode		5
Std. Deviation		1.959
Variance		3.837
Skewness		.237
Std. Error of Skewness		.337
Kurtosis		.567
Std. Error of Kurtosis		.662
Minimum		0
Maximum		10
Percentiles	25	4.00
	50	5.00
	75	6.00

Score

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	0	1	2.0	2.0	2.0
	2	2	4.0	4.0	6.0
	3	6	12.0	12.0	18.0
	4	9	18.0	18.0	36.0
	5	14	28.0	28.0	64.0
	6	7	14.0	14.0	78.0
	7	6	12.0	12.0	90.0
	8	1	2.0	2.0	92.0
	9	3	6.0	6.0	98.0
	10	1	2.0	2.0	100.0
	Total	50	100.0	100.0	

The mean score for demonstration of ethnobotanical knowledge among the entire sample population (n = 50) was 5.14. The most frequent score was a 5/10, with 14 villagers getting 5 out of 10 answers correct on the secondary survey. Only one person scored a perfect 10/10 and only one person scored 0/10. Closer analysis of the independent variables (Age Years, Age Cohorts, Gender, Education, and Income) provides or rejects possible explanations for the outcome of scores.

The following is correlational and regression data for Knowledge vs. Age Years:

Correlations

		Age Years	Score
Age Years	Pearson Correlation	1	.790**
	Sig. (2-tailed)		.000
	N	50	50
Score	Pearson Correlation	.790**	1
	Sig. (2-tailed)	.000	
	N	50	50

**. Correlation is significant at the 0.01 level (2-tailed).

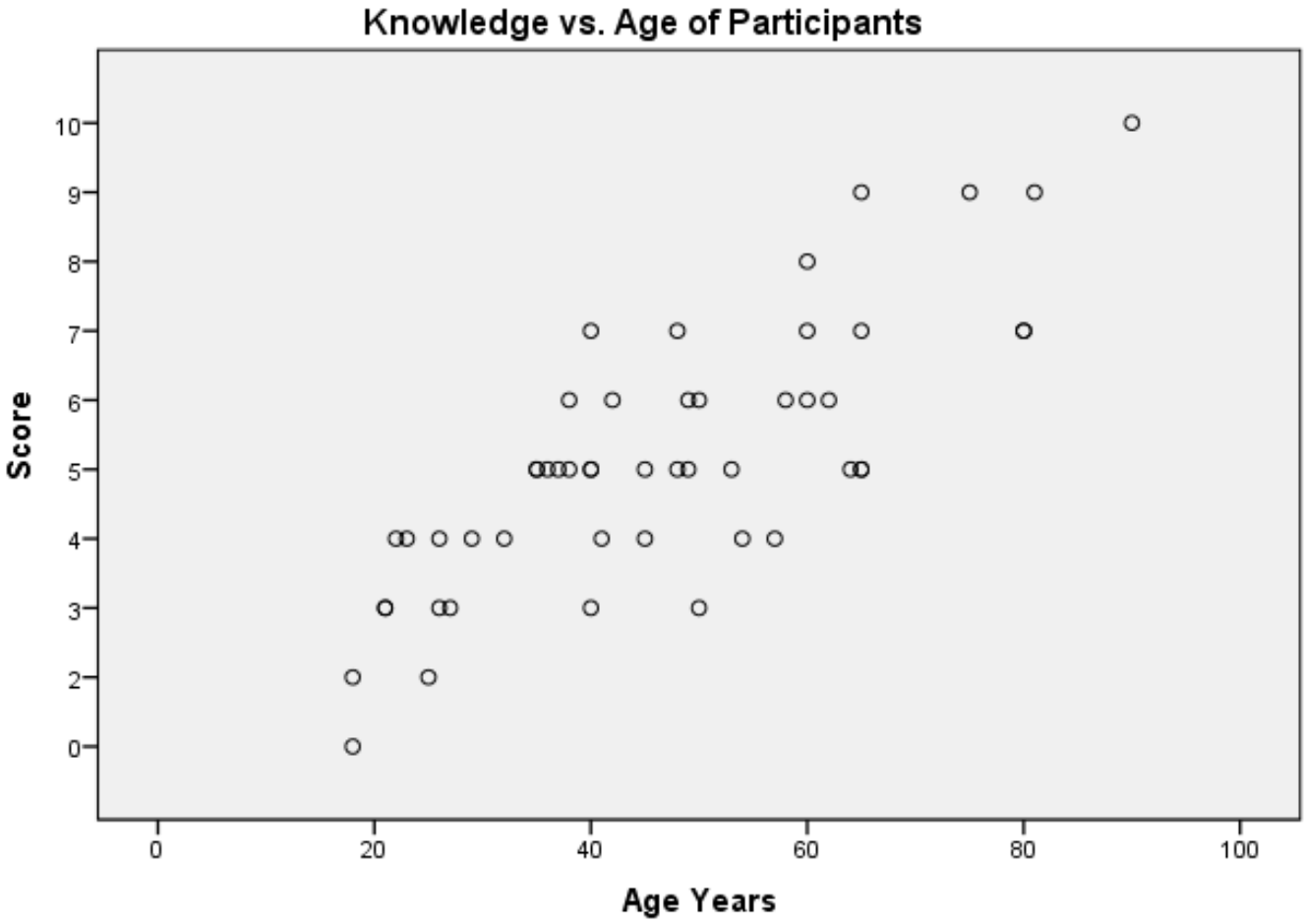


Fig. 1 shows a scatter plot representing the ages of all participants and their corresponding scores of the number of correct answers out of 10 multiple choice questions that were distributed in the secondary survey.

Regression

Descriptive Statistics

	Mean	Std. Deviation	N
Score	5.14	1.959	50
Age Years	46.56	18.123	50

Variables Entered/Removed[a]

Model	Variables Entered	Variables Removed	Method
1	Age Years[b]	.	Enter

a. Dependent Variable: Score

b. All requested variables entered.

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics		
					R Square Change	F Change	df1
1	.790[a]	.625	.617	1.212	.625	79.951	1

Model Summary

Model	Change Statistics	
	df2	Sig. F Change
1	48	.000

a. Predictors: (Constant), Age Years

Correlational analysis was done in order to reject or accept the null hypothesis:

H_0 = There is no significant correlation between possession of ethnobotanical knowledge and age.

The alternative hypothesis becomes:

H_A = There is a significant correlation between possession of ethnobotanical knowledge and age.

In the correlation data for knowledge vs. age of participants, the Pearson correlation factor is 0.790 and $p < 0.01$, so the correlation is significant. Thus, the null hypothesis is rejected and the alternative hypothesis is accepted. The scatter plot suggests that age and scores are

directly proportional to one another. Furthermore, a regression of the data reveals whether a correlation represents a true relationship and how much of the variance in scores of knowledge can be attributed to age.

The null hypothesis is:

H_O = There is no supported predictable relationship between age and possession of ethnobotanical knowledge.

The alternative hypothesis is:

H_A = There is a supported predictable relationship between age and possession of ethnobotanical knowledge.

The regression data further confirm the correlation between age and scores and also suggest that a true causal relationship exists between them. The R-squared value is 0.625 and the adjusted R-squared value is 0.617. Therefore, approximately 62% of the variance in scores can be attributed to the age of the participants. This is a significant R-squared value and $p < 0.01$. There is a supported relationship between possession of ethnobotanical knowledge and age of participants; the null hypothesis (H_O = There is no predictable correlative relationship between age and scores) is rejected and the alternative hypothesis (H_A = There is a predictable correlative relationship between age and scores) is accepted.

The following is (nonparametric) correlational analysis of Knowledge vs. Age Cohorts:

Nonparametric Correlations

Correlations

			Score	Age Cohorts
Spearman's rho	Score	Correlation Coefficient	1.000	.757**
		Sig. (2-tailed)	.	.000
		N	50	50
	Age Cohorts	Correlation Coefficient	.757**	1.000
		Sig. (2-tailed)	.000	.
		N	50	50

**. Correlation is significant at the 0.01 level (2-tailed).

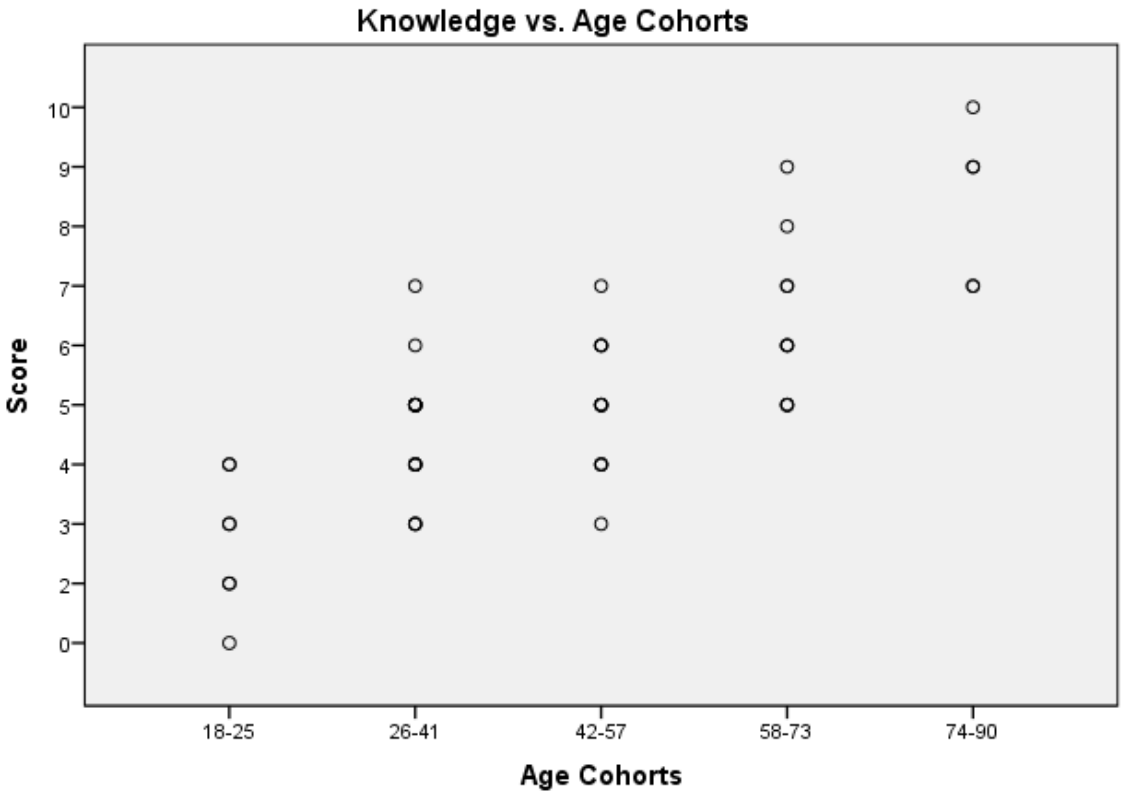


Fig. 2 shows the relationship between age cohorts and scores on the secondary survey. There are a total of 5 cohorts, where 1 = 18-25 years, 2 = 26-41 years, 3 = 42-57 years, 4 = 58-73 years, and 5 = 74-90 years.

The age of participants are grouped into five cohorts and each cohort is coded using numbers 1-5, where 1 = 18 to 25 years, 2 = 26 to 41 years, 3 = 42 to 57 years, 4 = 58 to 73, 5 = 74 to 90 years. According to the graph of the age cohorts, a distinct grouping pattern emerges under the structure of three biological generations. The parent generation (P) is cohorts 4 and 5, their offspring (G_1) are cohorts 2 and 3, and the offspring of G_1 is cohort 1 (G_2). Among the three generations, P scores ranged from 50% to 100% correct answers. G_1 scored from 30% to 70% correct. G_2 generated scores ranging from 0% to 40% correct. The overall trend among the cohorts still suggests a decline in the amount of knowledge demonstrated by each generation. For correlation data, the null hypothesis is:

H_O = There is no significant correlation between possession of ethnobotanical knowledge and age cohorts.

The alternative hypothesis is:

H_A = There is a significant correlation between possession of ethnobotanical knowledge and age cohorts.

The Spearman correlation factor is 0.757 and $p < 0.01$, so the null hypothesis is rejected. The data are significant and a correlation exists.

The following are descriptive statistics for scores based on Gender and comparative test results between females and males for Knowledge vs. Gender:

Statistics

		Gender = 1 (FILTER)	Score
N	Valid	26	26
	Missing	0	0
Mean		1.00	5.73
Median		1.00	5.50
Mode		1	4[a]

Statistics

		Gender = 2 (FILTER)	Score
N	Valid	50	50
	Missing	0	0
Mean		.48	5.14
Median		.00	5.00
Mode		0	5

Group Statistics

	Gender	N	Mean	Std. Deviation	Std. Error Mean
Score	Female	26	5.73	2.070	.406
	Male	24	4.50	1.642	.335

Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means						
									95% Confidence Interval of the Difference	
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
Score	Equal variances assumed	1.615	.210	2.316	48	.025	1.231	.531	.162	2.299
	Equal variances not assumed			2.338	46.974	.024	1.231	.526	.172	2.290

The data for gender were coded as follows: 1 = female, 2 = male. Data reveal that the average scores of females were higher than those of males, suggesting that local medicinal knowledge is slightly more commonly known among the female population versus the male population. Although the independent t-test reveals that there is no statistically significant difference between the mean value of score for females and males, the average score of

knowledge for females was 5.73 and the average score for males was 4.5. The small discrepancy can be accredited to cultural gender roles of men and women in Adhi; this will be further explored in the qualitative data gathered from informal interviews.

The following is a (nonparametric) correlation data analysis for Knowledge vs. Education:

Nonparametric Correlations

Correlations

			Score	Education
Spearman's rho	Score	Correlation Coefficient	1.000	-.606**
		Sig. (2-tailed)	.	.000
		N	50	50
	Education	Correlation Coefficient	-.606**	1.000
		Sig. (2-tailed)	.000	.
		N	50	50

**. Correlation is significant at the 0.01 level (2-tailed).

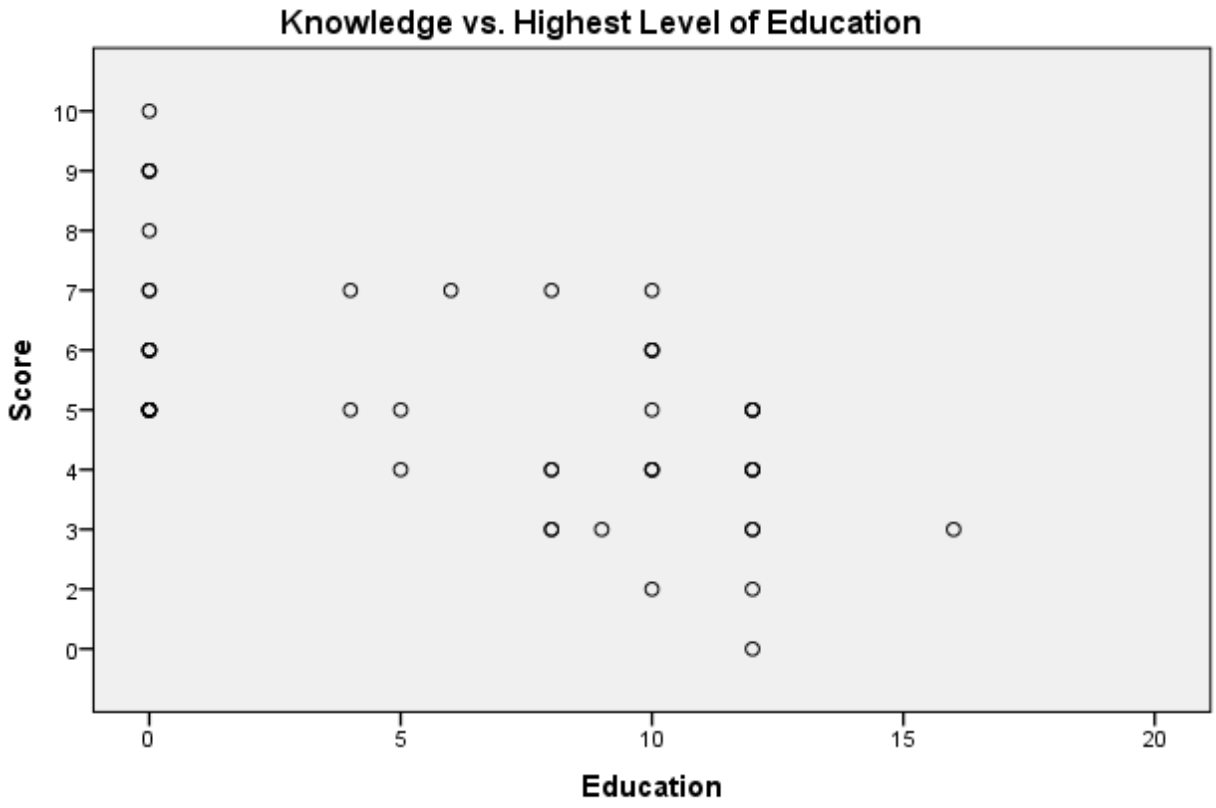


Fig. 3 depicts the highest level of education completed by each participant and their corresponding score on the secondary survey. The values for education are given by the highest grade completed in grade school, with the exception of one participant that completed her B.A. The number given for receiving a B.A. is 16, which represents the four years of undergraduate study after completing 12th grade.

The null hypothesis is:

H_0 = There is no significant correlation between possession of ethnobotanical knowledge and education.

The alternative hypothesis is:

H_A = There is a significant correlation between possession of ethnobotanical knowledge and education.

Correlation data for knowledge and highest level of education completed by the participant show a statistically significant Spearman correlation of -0.606 with a p-value of less than 0.01 and the alternative hypothesis is accepted. The correlation is negative, however, which indicates that the higher the completed level of education of a participant, the less they know about herbal remedies.

The following is a (nonparametric) correlational data analysis of Knowledge vs. Income:

Nonparametric Correlations

Correlations

			Score	Income
Spearman's rho	Score	Correlation Coefficient	1.000	.090
		Sig. (2-tailed)	.	.535
		N	50	50
	Income	Correlation Coefficient	.090	1.000
		Sig. (2-tailed)	.535	.
		N	50	50

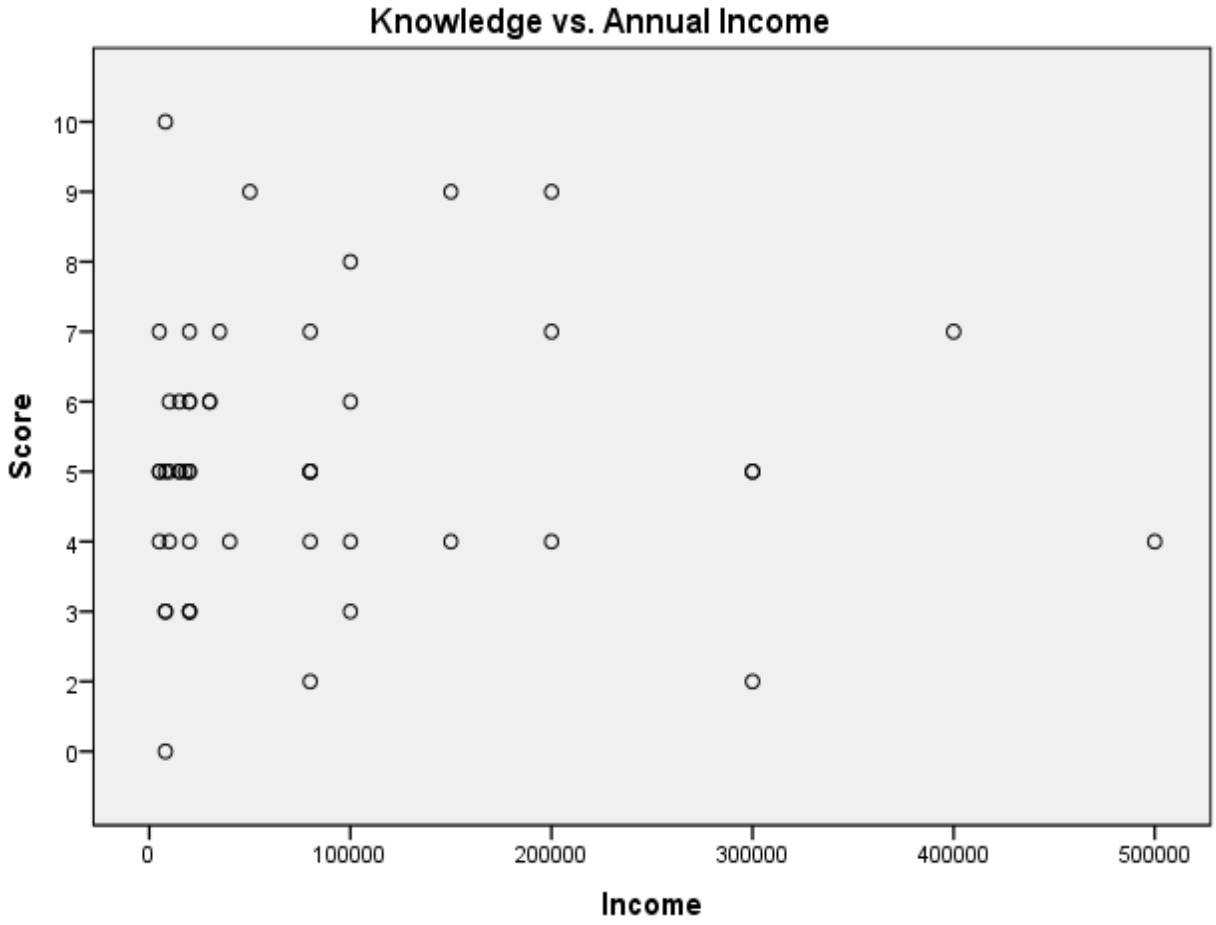


Fig. 4 shows the scatter plot of the approximate annual income of each participant and the score recieved on the secondary survey.

The null hypothesis is:

H_0 = There is no significant correlation between possession of ethnobotanical knowledge and income.

The alternative hypothesis is:

H_A = There is a significant correlation between possession of ethnobotanical knowledge and income.

As the data show, the Spearman correlation factor is 0.090 and $p > 0.01$. There is no significant correlation between annual income and possession of ethnobotanical knowledge; the null hypothesis is retained. The purpose of examining this relationship was to determine whether earning more money could make western medicine more affordable and possibly more preferred; however, statistical analysis demonstrates that the annual income of the villagers is not a factor in the decreased possession of local medicinal knowledge.

Overall (with the assumption that n = N), statistical analysis of the quantitative data reveals a decrease in the possesion of ethnobotanical knowledge with each successive generation among the sampled population in Adhi, Punjab. Majority of the diminished demonstration of knowledge can be attributed to the age of the participant and a significant cofactor is education; the higher the level of education, the less the knowledge of home remedies is demonstrated by a participant, suggesting that ethnobotanical knowledge is not being passed down generations as frequently. Females exhibited a slightly higher amount of knowledge than males; however, it can be explained by gender roles in the village. Income has no significant correlation to the decline of ethnobotanical knowledge. Although quantitative data are helpful in providing numerical evidence of the decreased demonstration of local medicinal knowledge and possible factors for this trend, it cannot deliver proof of the villagers shifting from use of herbal home remedies to western

medicine. Qualitative data better serves to give insight into the perspectives and attitudes of the villagers towards western medicine and folk medicine.

Qualitative Data Analysis

Following the first part of the study, in which two formal survey instruments were employed to collect quantitative data, the second part of the study focused on the collection of qualitative data. Informal interviews and conversations were conducted with approximately half of the original sample population (27 participants). The 27 villagers that partook in the qualitative data collection varied in age and gender: 15 females, 12 males and ages ranging from 18 to 90 years old. The informal survey was a guided conversation comprised of 6 questions. The questions sought to gain insight on the perspectives of the villagers on the use and efficacy of western medicine versus traditional indigenous medicine. A distinction must be made, however, between the *use* of folk medicine as opposed to the *knowledge* of folk medicine. Using indigenous remedies to treat ailments does not denote to having ethnobotanical knowledge. Many villagers continue to use herbal medicine, but they do not prepare the remedies themselves, rather a female of the household will prepare it for the sick family member.

Qualitative analysis will provide a greater understanding of if and why a decline in the possession of ethnobotanical knowledge is occurring, including the use and preparation of home remedies. The interviews did not entirely follow the pre-planned guided conversation structure; however, the principal goals were met and I was able to gain an understanding of the viewpoints of the villagers regarding both forms of medicine—western and traditional.

Analysis of the qualitative data reveals several trends among the 27 participants, trends which can further be categorized by the following factors: age and gender. There were several special cases where participant viewpoints were further specific to a certain age group and gender, namely elderly female participants and young male participants.

The interviews revealed several common viewpoints of the use and efficacy of western medicine and indigenous medicine. When asked which form of medicine they use more often, almost immediately all the participants answered that their first choice is western medicine. But when asked further about treating various diseases, illnesses, and symptoms, the villagers felt as though the type of illness mandated the type of treatment. The deciding factor is whether the ailment is acute or chronic. In general, the villagers resorted to herbal home remedies first for symptoms with a sudden (acute) onset such as fevers, aches and pains, coughs, diarrhea, constipation, vomiting, etc. For chronic conditions such as diabetes, hypertension, and cancer, villagers opted to visit a licensed physician and receive western treatments. Aside from acute vs. chronic illnesses, there was a general consensus on using home ethnobotanical remedies for mild symptoms or sicknesses and using western medications for more serious concerns. For example, the villagers said they would seek western health care for any serious or fatal illness, in this case acute or chronic, such as malaria, dengue fever, cancers, cardiovascular disease, and liver disease. In contrast, the participants or their family members preferred to use home remedies for simple ailments such as colds, migraines, hair loss, and gastrointestinal disturbances. Villagers agreed that occasionally home remedies can be unreliable due to the lack of consistency in duration and dosage. For some people, a remedy may need to be continued longer or taken more frequently than for others. Thus, western medicine is

deemed more reliable and given priority for more severe illnesses. There were several exceptions, however, when villagers had opted to use local remedies for chronic or severe ailments. For example, a few villagers had taken an herbal home remedy prepared with *tulsi* leaves to treat Typhoid (see Appendix 5). Some villagers had mentioned using home remedies to treat and possibly cure diabetes (see Appendix 5), as they had heard and knew of success stories from others. Another factor that influenced the villagers' choice of treatment was access to transportation. Some participants mentioned that it is easier to use home remedies for acute and mild ailments because transportation is often an issue for them. Some of them do not have enough money to own cars and they have to walk three kilometers to the nearest bus stop or they must ask for a ride from neighbors in order to visit a hospital or licensed physician. It is also important to note that the younger participants (ages 18-22) did not actively choose to use the home remedies, rather their mothers or grandmothers prepared the herbal remedies and gave them to these participants. During my study, I did not further examine the issues of transportation and accessibility to a healthcare facility; however, the question arises whether or not lack of transportation plays a significant role in the use of western medicine versus folk medicine. This should be further researched.

Within the category of age, two distinct perspectives were observed between the young versus the elderly. Participants from the ages of 18 to 28 years said they had been exposed to herbal remedies within their households, but they had never prepared them, and they had learned little to none ethnobotanical knowledge from their elders. They told me that it was their mothers and grandmothers that prepared and gave them the herbal therapies. The young participants also expressed a strong preference for western medicine,

as they believed it to be more effective. A woman, age 45 described the attitude of her daughter towards herbal remedies, "I used to prepare a facial mask for my daughter made from graham flour, milk, and "*karaati"* for her acne. She applied it every night and let it sit for 10 minutes and then she washed her face. But she doesn't do it anymore. She doesn't listen to me. She says it's not working and it takes too much time, but I saw a difference, her skin was so nice and soft. She just doesn't listen" (translated from Punjabi). When I asked an 18-year-old man about his use and preference for either type of medicine, he jokingly responded, "The only home remedy I use is home brewed alcohol" (translated from Punjabi). He went on to explain that although his mother sometimes makes herbal remedies at home, he is reluctant to use the herbal remedies because he considers them to be "useless" and a waste of time. Whenever he is feeling malaise, he simply visits the village doctor to get western medication to relieve his symptoms. The reluctance to use folk remedies among the younger crowd is similar to the findings of Katewa et al. (2004), who suggest younger generations have a tendency to diverge from traditional lifestyles due to modernization. The elderly participants said that they used herbal remedies frequently as kids. The reason for this was often explained in similar terms as in this statement from a 80-year-old woman: "Western medicine was not widely available and [herbal remedies] was the common form of medicine in most households". Now, however, the elderly have switched use to western medication. When I asked the elderly participants why they rely on western medication more often than home remedies, one woman answered, " That is just what we use now. That is what everyone uses now. We [the elderly] just take whichever pills the doctor tells us to take or whatever our children bring back from [the village doctor]" (translated from Punjabi, name of doctor is omitted and replaced with 'the

village doctor' to provide confidentiality). It became apparent from the conversations I had with the elderly villagers that western medicine was the standard, and the general expectation was that it should provide fast and effective treatment because it is "advanced" and uses new technology. With similar findings in studies conducted by Piron et al. (2000) and Gould (Landy, 1974), the shift towards biomedicine can partially be explained by the phenomena of "folk pragmatism" and "pragmatic acculturation." Folk pragmatism and pragmatic acculturation are defined as the process by which local populations adopt characteristics of non-native cultures due to practical benefits or uses. In Singapore and Sherapur, India, the adoption of western medicine was due to the technology associated with it, which was absent from Traditional Chinese Medicine (TCM) and local folk practices (Piron et al., 2000; Landy, 1974). Some senior citizens in Adhi also expressed that it is relatively easier to take western pills because they come pre-packaged and do not require any preparation, further providing support for the possibility of pragmatic acculturation occurring based on perceived practicality of biomedicine. Apart from the contrasting views between the youth and the elderly, the general trend was still present: Western medicine is used more frequently, regardless of stated preference.

Analysis of qualitative data based on gender provided several new insights on the practice of and perspectives about indigenous medicine. Both males and females shared the same viewpoint. The male participants articulated the belief that ethnobotanical knowledge and more specifically the preparation of therapies are reserved to the women only. They said they have little or no experience with preparing them. It is their mothers and wives that make and give them the remedies. The females expressed similar views. There were several instances when I asked female participants if their husbands, sons, or

fathers were home or available to participate in the study and they replied chuckling and saying that men know nothing about herbal medicine and that they have never stepped foot in the kitchen or made anything for themselves. They made it clear that such activities fall under the responsibilities of women. This is a result of the commonly accepted gender roles in society. I encountered many elderly males who were familiar with the ingredients, formulas, and preparation of remedies; however, they had never actually prepared the treatments themselves because both men and women believe that females are responsible for domestic responsibilities (i.e. preparing food or home remedies). Although gender roles still exist and have prevented men from making the treatments themselves, many still possessed the knowledge of how to prepare them, and therefore males still need to be included in this study. Furthermore, gender roles do not automatically imply that only females in rural India will demonstrate and use ethnobotanical knowledge. In fact, in the study conducted by Panghal et al. (2010), by tradition, only the males in the Saperas community of a small village in the state of Haryana were allowed to practice and pass on knowledge of herbal remedies. The formulas were kept secret within families and only passed on from father to son.

The informal interviews with the 27 participants revealed a characteristic gender difference in possession and use of ethnobotanical knowledge in Adhi. This qualitative information supports the quantitative data that revealed a slightly higher average for the possession of ethnobotanical knowledge among females, but the qualitative data have a much stronger gender difference. In other words, the perceived gender difference may be larger than the actual gender difference in knowledge about ethnobotanical remedies.

Several special cases were also observed in which both age and gender were common factors: young male participants and elderly female participants. Through conversation the young males shared the fact that they had no familiarity with knowledge of herbal remedies. The only exposure they had ever had to local medicine came from remedies their mothers or grandmothers had administered to them, for which they could not recall what ingredients were used. And unlike any other combination of age group and gender, the young men exhibited a sense of reluctance in using home remedies. They felt more comfortable taking western medications and believed them to be more effective. The special case of elderly women revealed that based on perceived efficacy of treatments, there was a lack of preference for either medicine. For these women, the choice to use western medications more frequently rather stemmed from an efficiency factor. They choose to take western treatments because of the convenience of ingesting pre-packaged pills as opposed to preparing remedies at home. One elderly female remarked, "I have diabetes. There are several herbal treatments for it, like crushing *Jamun* seeds and making a powder out of them. Then mixing the powder into water and drinking it. But I just take western pills every day to treat my diabetes. It is easier, there is no preparation required to keep my blood sugar level maintained" (translated from Punjabi). The preparation of various remedies can be time consuming, requiring many steps (i.e. boiling, drying, soaking) and ingredients. Similar opinions were expressed by participants in a study of perceptions of Traditional Chinese Medicine (TCM) in Hong Kong (Lam, 2001). Lam (2001) observed that many Hong Kong residents preferred to take western medication as opposed to TCM treatments; they felt inconvenienced by the time it would require to prepare traditional treatments. For the young males in Adhi, a strong preference for western

medicine was observed centered on their assessment of perceived effectiveness, while a lack of preference existed among the elderly women; they did not believe one type of medicine to be more effective than the other, rather they established their choice of treatment on effort and time efficiency.

Based on the viewpoints drawn from the general population, the elderly and the youth, and males and females, there is supportive evidence of the diminishing use of ethnobotanical remedies. The informal interviews revealed western medicine to be more frequently used by participants. All participants view it as the standard in medicine, especially for chronic or severe illnesses, and find western treatments to be more convenient than folk medicine. The younger generations lack knowledge of and familiarity with preparation of the remedies and the young males believe western medications to be more effective than home remedies. The elderly population has been exposed to both forms of medicine; however, they do not believe one to be significantly better than the other. The elderly women specifically, make their choice based on the convenience of taking western pills. Both genders believe it is the responsibility of females to practice and prepare local herbal treatments, reinforcing the gender roles of men and women in the village. Additionally, there seems to be a lessening in the passing down of ethnobotanical knowledge. This is alarming due to the fact that younger generations are increasingly losing the option to practice and prepare home remedies. The agency of the villager may therefore become compromised and jeopardized with each successive generation. The ability to choose which treatments to use is vanishing among the younger generations because they are not being taught the knowledge and/or preparation of folk remedies.

The qualitative data serve to provide information on the preference of practicing folk medicine versus the preference for the use of western medicine. It does not provide proper evidence for the amount of ethnobotanical knowledge present among participants when divided into age cohorts and gender categories. However, the qualitative data can be used to support the quantitative trend demonstrating a decrease in possession of ethnobotanical knowledge.

Conclusion

For centuries now, information, people, and technology have been flowing around the globe, spreading and expanding outwards from cultural hearths. As discussed by Madhuri Sharma (2012), western medicine spread to other regions of the world as a result of colonialism and was introduced to India by the British in the 19th Century. According to Frantz Fanon colonialism has impacted the way in which colonized people—and their descendants—view themselves. Colonial powers created an inferiority complex in the minds of the local population leaving a lasting impact of a distorted view of the west as more advanced, intellectually superior, and the standard model to follow on the path to development. Although Fanon's work inspired me to explore the presence of western ideology and institutions in modern day India, I discovered that the "colonization of the mind" phenomenon could not be applied to the hybridized practice of medicine in rural Punjab and my data do not support his theory. Rather than the villagers being victims of colonization and having limited agency as a result, I found that the villagers indeed have agency and the ability to make decisions for themselves regarding healthcare. The issue is rather that future generations may have fewer options from which to choose.

I hypothesized that due to the increased flow and availability of medical information, technology, and infrastructure to the rural populations of India under the context of hybridization of global cultures, there is a decline in the use and possession of ethnobotanical knowledge in the village of Adhi in Punjab. My research in Adhi served to validate my hypothesis and furthermore explore possible explanations for the westernization of healthcare in rural Punjab. Using quantitative and qualitative methods, I have confirmed a downward trend in the amount of knowledge of herbal folk medicine demonstrated by each successive generation of villagers in Adhi, as well as a decline in the practice and preparation of folk remedies. There is a significant correlation between amount of ethnobotanical knowledge demonstrated and the age of participants, once again suggesting diminished use and knowledge across generations. The qualitative data I collected from informal interviews with participants also supports this conclusion; the perception, preference, and use of western medicine is generally higher than that of herbal home remedies, notably among the younger population, while the elderly population showed no stated preference for either based on efficacy. They still used biomedicine more frequently than home remedies, because biomedicine was often seen as more efficient. Other factors that may affect the possession and retention of ethnobotanical knowledge include gender and income; however, there is no statistically significant evidence to support causal relationships. The existing gender roles, however, reinforce the pattern of greater demonstration of knowledge of folk medicine among females.

Although the results of my case study cannot be generalized to the total population of the village of Adhi, the state of Punjab or the entire nation of India, the research I have conducted in Adhi can provide a foundation for future and similar studies regarding the

decline in use and demonstration of local medicinal knowledge in rural areas of India and other developing nations. The decreased tradition of passing on ethnobotanical knowledge and preparing home remedies that is occurring in Adhi may be occurring elsewhere. Traditionally, the remedies are orally passed down through generations; however, with the increasing shift in preference for and practice of western medicine, the transmission of knowledge is lessening. If this trend continues, it could result in the loss of Punjabi ethnobotanical knowledge. While I was in Punjab, I discovered that herbal remedies have been documented and books (in Punjabi) with treatments for various illnesses and conditions are available in large cities. These books, however, are not sold outside of large cities and are only useful to those who are literate, have access to transportation, and are actively seeking to learn and prepare herbal remedies. Additionally, books are not always a reliable source for ethnobotanical knowledge because some books only list ingredients necessary for a remedy, but do not provide instructions on how to prepare a remedy or the proper proportions and quantities of ingredients. Hence it is important to continue passing on ethnobotanical knowledge, as it is fundamental to the actual practice of local medicine. Elements of authenticity may begin to lack and remedies may not be prepared correctly; learning and using ethnobotanical knowledge and home remedies experientially and firsthand reduces these risks. By committing it to memory, people are more likely to continue the use of home remedies in the future and for generations to come, thereby maintaining a sense of independence and autonomy over healthcare, instead of creating a reliance on biomedicine and western healthcare consultants. As long as the knowledge continues to circulate and pass down generations, villagers have the option to accept and reject aspects of both forms of medicine at their own will. But with a decline in the passing

down of ethnobotanical knowledge, younger generations are losing the choice of folk remedies as a viable and legitimate form of medicine. Useful knowledge for humanity is being lost in this process; thus, I believe it is essential that the oral tradition of learning and passing on ethnobotanical knowledge is kept alive in rural Punjab.

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Appendix 1

Informal Interview Guide:

- Have you ever used herbal or home remedies to treat or cure an illness?
    - From where or whom did you learn about these remedies?
- Have you ever seen a western doctor or taken prescription medication to treat or cure an illness?
- Do you have a preference for either herbal remedies or western medicine?
    - Why?/Why not?
    - Do you use one type of medicine more than the other?
    - Are there situations for which you believe one will be more effective than the other? If so, please elaborate.
- What are your thoughts about herbal medicine with regards to effectiveness, short-term treatment, long-term treatment, mild illnesses, and severe illnesses?
- What are your thoughts about western medicine with regards to effectiveness, short-term treatment, long-term treatment, mild illnesses, and severe illnesses?

Appendix 2

Formal Primary Survey (in both English and Punjabi):

Survey No. _____

1. What is your gender?

   ☐ Male ☐ Female

2. What is your age? _____

3. Do you know how to read and/or write in the following languages?

   Punjabi ☐ Read Only ☐ Write Only ☐ Both

   Hindi ☐ Read Only ☐ Write Only ☐ Both

   English ☐ Read Only ☐ Write Only ☐ Both

4. What is the highest level of schooling you have completed?

   _____

5. If you attended school, what type of school was it?

   ☐ English Medium

   ☐ Hindi Medium

   ☐ Punjabi Medium

6. What is your occupation?

   _____

7. What is your approximate yearly income or salary?

   _____

8. How close is the nearest healthcare facility to you?

   _____

9. How do you rate the effectiveness of herbal medicine or home remedies vs. western medicine and prescribed medication?

Herbal Medicine	**Western Medicine**
☐ Excellent	☐ Excellent
☐ Good	☐ Good
☐ Average	☐ Average
☐ Poor	☐ Poor
☐ Very Poor	☐ Very Poor

10. Can you list all the useful plants, herbs, and spices you know and what they are used for?

Appendix 3

1. ਤੁਹਾਡਾ ਲਿੰਗ ਕੀ ਹੈ?

☐ ਪੁਰਸ਼ ☐ ਔਰਤ

2. ਤੁਹਾਡੀ ਉਮਰ ਕੀ ਹੈ ? _____

3. ਕੀ ਤੁਸੀਂ ਜਾਣਦੈ ਹੋ ਇਨਾ ਭਾਸ਼ਵਾ ਨੂੰ ਲਿਖਣਾ ਜਾਂ ਪੜ੍ਹਨਾ?

ਪੰਜਾਬੀ	☐	ਸਿਰਫ ਪੜ੍ਹਨਾ	☐	ਸਿਰਫ ਲਿਖਣਾ	☐	ਦੋਵੇਂ
ਹਿੰਦੀ	☐	ਸਿਰਫ ਪੜ੍ਹਨਾ	☐	ਸਿਰਫ ਲਿਖਣਾ	☐	ਦੋਵੇਂ
ਅੰਗਰੇਜੀ	☐	ਸਿਰਫ ਪੜ੍ਹਨਾ	☐	ਸਿਰਫ ਲਿਖਣਾ	☐	ਦੋਵੇਂ

4. ਤੁਹਾਡੀ ਉਚੇਚੀ ਪੜ੍ਹਾਈ ਕਿਥੋ ਤੱਕ ਹੈ? ਜਾਂ ਕੀ ਹੈ?

_____

5. ਜੇਕਰ ਤੁਸੀਂ ਸਕੂਲ ਵਿੱਚ ਗਏ ਹੋ ਤਾਂ ਉਹ ਕਿਸ ਤਰ੍ਹਾਂ ਦਾ ਸਕੂਲ ਸੀ?

☐ ਸ਼ੁੱਧ ਅੰਗਰੇਜੀ

☐ ਸ਼ੁੱਧ ਹਿੰਦੀ

☐ ਸ਼ੁੱਧ ਪੰਜਾਬੀ

6. ਤੁਸੀਂ ਕੀ ਕਰਦੇ ਹੋ?

_____

7. ਤੁਹਾਡੀ ਸਾਲ ਦੀ ਤਨਖਾਹ ਜਾਂ ਆਮਦਨ ਕਿੰਨੀ ਹੈ?

_____

8. ਕਿਵੇਂ ਤੁਸੀਂ ਆਪਣੇ ਡਾਕਟਰ ਨਾਲ ਗੱਲਬਾਤ ਕਰਦੇ ਹੋ ਜਾਂ ਮਿਲਦੇ ਹੋ?

_____

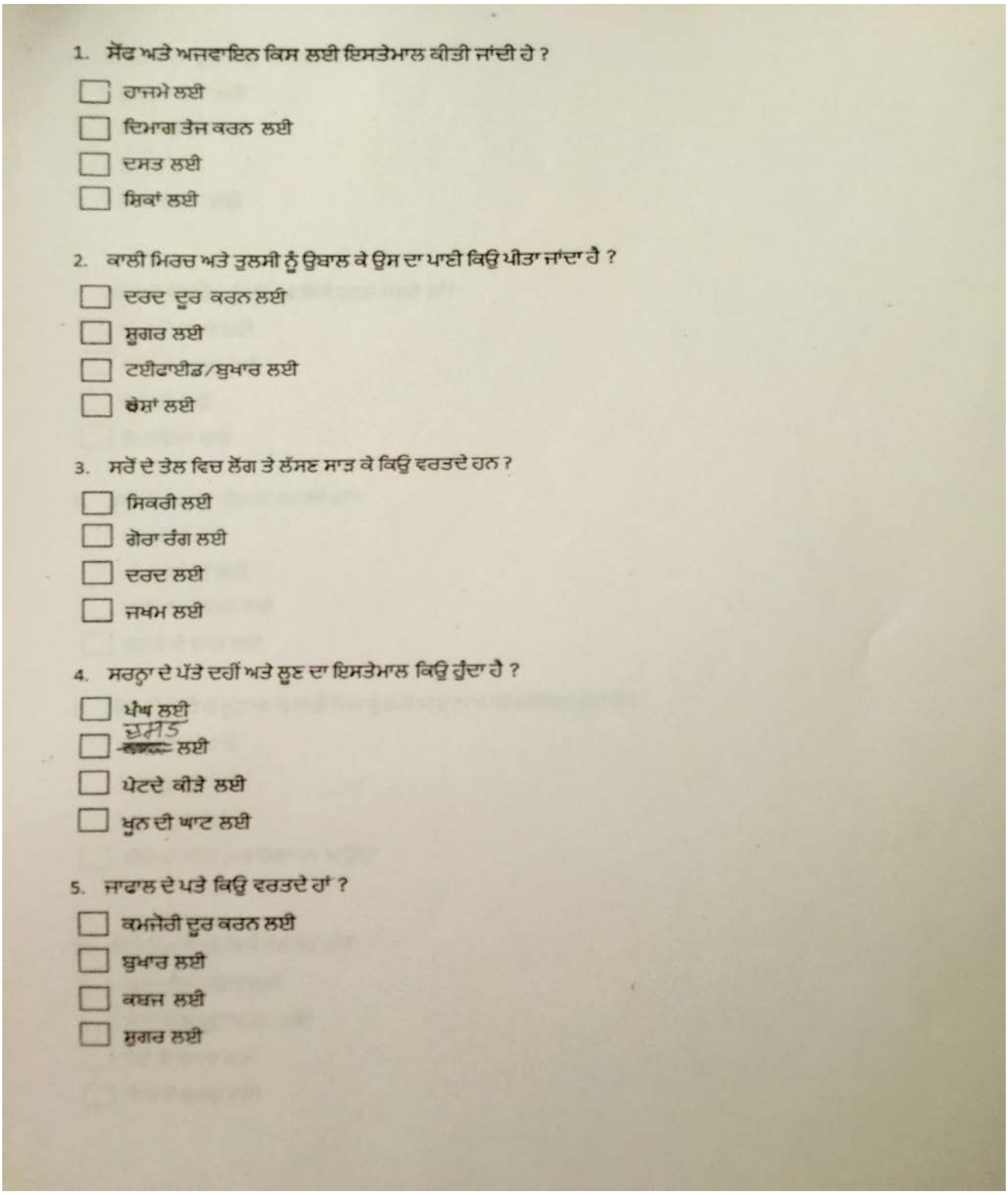
9. ਕਿਵੇਂ ਤੁਸੀਂ ਦੇਸੀ ਦਵਾਈਆਂ ਅਤੇ ਅੰਗਰੇਜੀ ਦਵਾਈਆਂ ਤੋਂ ਪ੍ਰਭਾਵਿਤ ਹੋ?

ਦੇਸੀ ਦਵਾਈਆਂ		ਅੰਗਰੇਜੀ ਦਵਾਈਆਂ	
☐	ਬਹੁਤ ਚੰਗੀਆਂ	☐	ਬਹੁਤ ਚੰਗੀਆਂ
☐	ਚੰਗੀਆਂ	☐	ਚੰਗੀਆਂ
☐	ਠੀਕ	☐	ਠੀਕ
☐	ਮਾੜਾ	☐	ਮਾੜਾ
☐	ਬਹੁਤ ਮਾੜਾ	☐	ਬਹੁਤ ਮਾੜਾ

10. ਕੀ ਤੁਸੀਂ ਦੱਸ ਸਕਦੇ ਹੋ ਕੀ ਵਰਤਨਜੋਗ ਪੌਦੇ, ਆਲ੍ਹਣੇ ਅਤੇ ਮਸਾਲੇ ਕਿਹੜੇ ਹਨ ਅਤੇ ਉਨ੍ਹਾ ਦੀ ਵਰਤੋ ਕਿਸਲਈ, ਕਿਥੇ ਤੇ ਕਿਉ ਹੁੰਦੀ?

Appendix 4

Formal Secondary Survey (created and printed while in Punjab, written in Punjabi):



1. ਸੌਂਫ ਅਤੇ ਅਜਵਾਇਨ ਕਿਸ ਲਈ ਇਸਤੇਮਾਲ ਕੀਤੀ ਜਾਂਦੀ ਹੈ ?
   - ☐ ਹਾਜਮੇ ਲਈ
   - ☐ ਦਿਮਾਗ ਤੇਜ ਕਰਨ ਲਈ
   - ☐ ਦਸਤ ਲਈ
   - ☐ ਸ਼ਿਕਾਂ ਲਈ

2. ਕਾਲੀ ਮਿਰਚ ਅਤੇ ਤੁਲਸੀ ਨੂੰ ਉਬਾਲ ਕੇ ਉਸ ਦਾ ਪਾਣੀ ਕਿਉ ਪੀਤਾ ਜਾਂਦਾ ਹੈ ?
   - ☐ ਦਰਦ ਦੂਰ ਕਰਨ ਲਈ
   - ☐ ਸ਼ੂਗਰ ਲਈ
   - ☐ ਟਾਈਫਾਈਡ/ਬੁਖਾਰ ਲਈ
   - ☐ ਕੇਸ਼ਾਂ ਲਈ

3. ਸਰੋਂ ਦੇ ਤੇਲ ਵਿਚ ਲੋਂਗ ਤੇ ਲੱਸਣ ਸਾੜ ਕੇ ਕਿਉ ਵਰਤਦੇ ਹਨ ?
   - ☐ ਸਿਕਰੀ ਲਈ
   - ☐ ਗੋਰਾ ਰੰਗ ਲਈ
   - ☐ ਦਰਦ ਲਈ
   - ☐ ਜਖਮ ਲਈ

4. ਸਰਨ੍ਹਾ ਦੇ ਪੱਤੇ ਦਹੀਂ ਅਤੇ ਲੂਣ ਦਾ ਇਸਤੇਮਾਲ ਕਿਉ ਹੁੰਦਾ ਹੈ ?
   - ☐ ਪੇਂਘ ਲਈ
   - ☐ ~~ਕਬਜ~~ ਲਈ
   - ☐ ਪੇਟਦੇ ਕੀੜੇ ਲਈ
   - ☐ ਖੂਨ ਦੀ ਘਾਟ ਲਈ

5. ਜਾਫਾਲ ਦੇ ਪਤੇ ਕਿਉ ਵਰਤਦੇ ਹਾਂ ?
   - ☐ ਕਮਜੋਰੀ ਦੂਰ ਕਰਨ ਲਈ
   - ☐ ਬੁਖਾਰ ਲਈ
   - ☐ ਕਬਜ ਲਈ
   - ☐ ਸ਼ੂਗਰ ਲਈ

6. ਹਲਦੀ ਵਾਲਾ ਦੁੱਧ ਕਿਉ ਪੀਂਦੇ ਹਨ ?

- ☐ ਗੁਝੀਆਂ ਸੱਟਾਂ ਲਈ
- ☐ ਭਾਰ ਵਧਾਉਣ ਲਈ
- ☐ ਜੁਕਾਮ ਲਈ
- ☐ ਸਿਰ ਦਰਦ ਲਈ

7. ਫਟਕੜੀ ਦੀ ਖਿੱਲ ਨੂੰ ਪੀਸ ਕੇ ਕਿਥੇ ਵਰਤ ਸਕਦੇ ਹਾਂ?

- ☐ ਦੰਦਾ ਦੇ ਦਰਦ ਲਈ
- ☐ ਜੋੜਾਂ ਦੇ ਦਰਦ ਲਈ
- ☐ ਸਿਕਰੀ ਲਈ
- ☐ ਫਿਨਸੀਆਂ ਲਈ

8. ਭੂਰੀਆਂ ਮਿਰਚਾਂ ਪੀਸ ਕੇ ਵਰਤਦੇ ਹਾਂ?

- ☐ ਜਖਮਾਂ ਤੇ ਲਈ
- ☐ ਗੁਆਡਨੀ ਤੇ ਲਈ
- ☐ ਫਟੀਆਂ ਅੱਡੀਆਂ ਲਈ
- ☐ ਚੇਹਰੇ ਦੇ ਦਾਗ ਲਈ

9. ਮੱਕੀ ਦੀ ਰੋਟੀ ਤੇ ਲੂੰਣ ਪਾ ਕੇ ਦਹੀਂ ਵਿਚ ਚੂਰ ਕੇ ਖਾਣ ਨਾਲ ਕੀ ਫਾਇਦਾ ਹੁੰਦਾ ਹੈ ?

- ☐ ਭਾਰ ਘੱਟ ਹੁੰਦਾ ਹੈ
- ☐ ਰੇਸ਼ਾ ਦੂਰ ਹੁੰਦੀ ਹੈ
- ☐ ਦਸਤ ਦੂਰ ਹੁੰਦੀ ਹੈ
- ☐ ਹੱਡੀਆ ਵਿੱਚ ਲਚਕੀਲਾਪਨ ਆਉਂਦਾ

10. ਛੋਟੀ ਇਲਾਇਚੀ ਕਿਓਂ ਵਰਤਦੇ ਹਾਂ?

- ☐ ਅਖਾਂ ਦੀ ਕਮਜੋਰੀ ਲਈ
- ☐ ਚਿੱਟੇ ਵਾਲ ਦੂਰ ਕਰਨ ਲਈ
- ☐ ਪੇਟ ਦੇ ਦਰਦ ਲਈ
- ☐ ਸਿਰ ਦੇ ਦਰਦ ਲਈ

Appendix 5

List of common plants, roots, spices, extracts, and minerals used in Punjabi ethnobotanical remedies and their uses:

Plant, Root, Spice, Extract, Mineral (*Punjabi*)	Plant, Root, Spice, Extract, Mineral (*English*)	Used For
Adarak	Ginger	Cough, Sore throat, Phlegm/mucus buildup
Ajvain	Caraway	Digestion
Auleh	Indian Gooseberry, *Phyllanthus emblica*	Digestion
Borh da Dudh	Milk of Banyan Tree Leaves	Cold symptoms, Blemishes and dark spots on face
Bhuriyan Mirchan (pees keh)	Brown Peppers (ground)	Stye on eyelid
Choti Lachi	Green Cardamom	Digestion
Garam Masala	Blend of ground spices including - black peppercorn, mace, cinnamon, cloves, brown cardamom, green cardamom, cumin, nutmeg, and bay leaves	Hypotension

Ghayo	Clarified Butter	Prevents cold (if applied in nostrils regularly)
Haldi	Turmeric (powder)	Bruises, Pain
Jaffal (pateh)	Nutmeg Tree (leaves)	Constipation
Jamun (gitak)	Java Plum (pit)	Hyperglycemia
Kalaunji	Nigella Seeds	Knee (joint) pain/stiffness
Kala Loon	Pink Salt	Digestion
Kali Jeeri	Cumin	Hyperglycemia
Khas Khas	Poppy Seeds	Hyperglycemia
Laung	Cloves	Toothache
Malatthi	Liquorice	Cough, Cold
Nimbu	Lemon	Hypertension
Phatkari	Alum	Toothache, Bruises
Saron da Tehl	Mustard Oil	Aches, Bruises, Joint pain
Saunf	Fennel Seeds	Digestion
Sayi Karela	Baby Bitter Gourd	Hyperglycemia
Seviyan (garam)	Vermicelli (warmed)	Cold, Sore throat
Shaihd	Honey	Cough, Sore throat, Phlegm/mucus buildup
Sindoor	Vermillion Powder	Stye on eyelid
Sund	Dried Ginger Powder	Digestion
Tulsi	Holy Basil	Typhoid, Fever