

*An Essay Examining the Living Standards of American Colonists, English Workers, and American
Plains Indians in the Mid-Eighteenth Century*

by

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1. *Introduction*

The colonisation of present day eastern America opened up a new world for Europeans. There is no shortage of stories depicting the New World as a place of opportunity, but how well off were the colonists? This essay sets out to shed some light on that question by comparing the standard of living of American Colonists to British workers and northern Plains Indians in the second half of the eighteenth century. The biological standard of living refers to the health of a society's citizens. Some of the qualities that relate to are extent of disease, physical stature, and life expectancy. The biological standard of living is not the same as standard of living as conventionally defined, but the two are related. One of the main determinants of an individual's health is their diet and a healthy diet requires sufficient calories and other nutrients. These must be purchased or produced. Thus, within a given population anthropometric research has found a positive relationship between health and income (Komlos 2003, 4).

In order to compare the biological standard of living among groups a suitable proxy is required for health. Data on heights are available for the second half of the eighteenth century and height has been shown to be a suitable proxy for nutrition (Komlos 1989, 26). Genetic variations among populations account for some difference in heights, but this will mainly be an issue when discussing the Plains Indians¹. For this paper, height will be used as a proxy.

Traditional economic indicators, such as wages and income, are difficult to calculate in societies that existed almost three centuries ago; and for the Plains Indians, who lived a hunter/gatherer lifestyle, they are impossible to determine. In order to compare the living standards of English workers and Indians in the Hudson Bay region, Ann Carlos and Frank Lewis devised a model that compares utility and real income based on consumption. Their model separates consumption into four major categories: food, shelter, clothing and luxury items, and compares standards of living through relative consumption, while incorporating preferences and dietary constraints.

¹ The common ancestry of the colonists and British make genetic differences negligible. Although the Plains Indians and colonists have ancestral history that is less common, comparing heights is still informative.

This paper will apply the Carlos – Lewis method of comparing living standards to examine the well-being of American colonists relative to English workers and also to compare American colonists to some of their North American counterparts, the native tribes of the northern plains. The comparison of the colonists with English workers involves two groups with similar preferences, whereas the native – colonist comparison deals with two groups with very different preferences.

2. *Literature Review*

A. Biological Standard of living – Evidence on Heights

The Plains Indians had a mainly non-market economy, therefore calculating a standard of living based on income is virtually impossible. Franz Boas, one of the founders of American anthropology collected extensive data on the Plains Indians in the late nineteenth century (Steckel 1998, 287). His dataset was composed of thousands of observations that included several Indian groups, with the Crow and Sioux most represented. A detailed methodology for Boas' techniques does not exist, however his research is corroborated by travelers' accounts and skeletal records. According to Boas' measurements the Plains Indians were the tallest group in the world in the mid-nineteenth century. The average height of the Plains Indians was 172.6cm, 1.6cm greater than American troops at the time and 6.6cm greater than British troops.

It is likely that the mid-nineteenth century represented an economic and biological peak for the Plains tribes. Trade with the Europeans had allowed them to acquire sufficient guns, metal tools and horses for hunting the abundant supply of buffalo. An adequate protein intake from buffalo combined with the consumption of native vegetation likely formed a very nutritional diet. The low population densities and nomadic lifestyle would have contributed to keeping a sanitary living area and may have helped keep down the incidence of disease (Steckel 2001, 290).

Anthropometric history led to some surprising findings about the differences between America and Europe, as early as the eighteenth century. Historians discovered that, in the early eighteenth century the average height in America was already substantially greater than in Europe, a difference that persisted until the mid-twentieth century (Komlos 1995, 194). At the start of the revolutionary war American soldiers were 5cm taller than British soldiers of the same age (Komlos 1991, 353). The more favourable environment in America was so pronounced that even slaves had a higher average height than both Europeans and their African counterparts (Steckel 1979, 369). The similar present day heights of Europeans and African Americans suggest any genetic bias was minimal.

Soldiers in the latter half of the eighteenth century were actually taller than Plains Indians in the mid-nineteenth century and American soldiers in the mid-nineteenth century. From the 1840s until the 1870s the average height of Americans dropped almost 2cm (Komlos 1995, 100). This decrease in height coincided with rapid economic growth, one of a few instances in history where economic growth has occurred alongside a decrease in height².

In England the experience in terms of biological standard of living was different. By 1760 British average height was lower than American. From 1760 until 1840 there was a 70 percent population increase and an increase in the proportion of the population residing in urban centres rose from 17 percent to 27 percent. Food imports and agricultural output did not keep pace, and as a result nutritional intake decreased. This led for a time to a decrease in average height. Komlos estimates that nutritional levels did not return to 1760 levels until 1840 (Komlos 1995, 365).

The high biological standard of living experienced in Colonial America was most likely due to the abundance of food in America coupled with the lower population density. In America people thrived primarily as a result of strong work ethic coupled with greater access to natural resources. Although the Plains Indians lived a much different lifestyle than Colonial Americans, they similarly benefited from an

² The decrease in average height experienced in Colonial America in the nineteenth century took the title of 'tallest in the world' from the American Colonists.

abundance of resources. The New World provided an opportunity for different societies to thrive; the Plains Indians and American Colonists are two groups who took advantage of the favourable conditions.

B. Consumption – Based Living Standards

Carlos and Lewis (2010) researched the consumption of natives residing in the Hudson Bay region in the eighteenth century. Using a variety of sources, they determined ranges for each category of consumption. An adult male needed about 3,500 calories a day and 80 percent of these calories were from meat, predominantly from big game. Based on English prices, the cost of this diet exceeded the incomes of even the best-paid workers in England.³ Low wage English workers consumed 2,500 calories per day, 90 percent of which came from non meat and dairy sources.

Native clothing was fashioned out of animal skins that were hunted by the men and tailored by the women. Estimating the value of labour that is required to tailor a hide is difficult so Carlos and Lewis limit their estimates of native clothing value to the material used in production. Native women were skilled tailors and fashioned garments that had fitted sleeves and often contained embroidery. Carlos and Lewis estimate that the equivalent of five moose skins and three deer skins were required to clothe an adult male annually. English workers spent six percent of their annual budget on clothing. Regardless of the conversion used to price skins, at best English workers spent half as much on clothing as Natives.⁴

Housing for Natives residing in the Hudson Bay Region served a limited purpose. Unlike in England, Native shelter did not constitute a home, nor did it include many of the comforts that English workers enjoyed. The Natives occupied wigwams in the winter and longhouses in the summer.⁵ Carlos and Lewis derive their estimate of Native housing cost by estimating the cost of skins used to construct a

³ Food summary comes p.169-173 of 'Commerce by a Frozen Sea'

⁴ Clothing summary p.173 – 175. Skins are priced twice, a high estimate using English prices and a low estimate using prices at the trading post

⁵ A wigwam is a dome or conically shaped structure covered in some combination of animal skins, barks and rush carpets. They lived in units of three or four families totaling fifteen people

wigwam and by comparing the longhouses to houses constructed by early nineteenth century settlers to Upper Canada. The value of housing of English workers far exceeded that of their Native counterparts. Carlos and Lewis capitalize the annual rent of a non-farm low-wage worker over the course of twenty years at 6 percent to estimate housing value of an English worker. After incorporating the cost of fuel needed to heat the shelter, Carlos and Lewis estimate that Native housing was worth one third to one half that of the English worker.⁶

Natives benefitted from trade with the Europeans by acquiring tools, tobacco, alcohol and decorative items. Carlos and Lewis use trade data from York Factory to estimate the value of luxuries consumed by the Natives⁷. Carlos and Lewis use the work of Charles Feinstein to estimate English consumption of luxuries. Feinstein studied English household budgets and estimated tea, coffee, sugar, and treacle accounted for 6.9 percent of workers' expenditure and alcohol a further 10 percent. Carlos and Lewis estimate the value of Native consumption of luxury items to be between one sixth and one quarter of the value of an English worker.

Carlos and Lewis show that the relative position of the Native or the English worker depends on the preferences assumed. Using native weights, the natives had real incomes between 8 and 22 percent higher than English workers, but if English weights are used, the real income of native's was between 10 and 24 percent lower.⁸

3. *Consumption of American Colonists*

A. Food

The diet in Colonial America reflected the country of origin of the immigrants. As Reay Tannahill put it (Tannahill 1989, 196),

⁶ Shelter summary from p.175-177 of Carlos and Lewis

⁷ For simplicity they limit their estimate to trade items and make no estimate of Native produced luxuries

⁸ The high or low value is due to two estimate being used, a high and a low estimate of the value of consumable goods. P. 179-182 Carlos and Lewis

“As new settlers had arrived in America from various European countries, they had introduced their own traditional dishes, judiciously adapted when necessary to suit the materials available.”

Wherever possible dishes were copied from traditional recipes, but where ingredients were not available substitutions were made. This also led to changes in preparation. A high proportion of bowls among recovered dining ware suggests stews and porridges were a primary source of nutrition (Gallman and Wallis 1992, 241). Colonists ate well in America. According to mid-eighteenth century poorhouse menus from Philadelphia and New York, each man was allocated 0.44lbs of meat per day or 160lbs annually (Shammas 1980, 172). Edwin Perkins reports that a servant in Georgia in the 1740s received 200lbs of meat annually (Perkins 1980, 96). Billy Smith re-created a typical diet for a Pennsylvanian labourer who lived in the last half of the eighteenth century where Smith assumed the composition of the diet was the same as that of a patient in the Pennsylvania Hospital (Smith 1979, 170). The Pennsylvania Hospital was a publicly-run institution that was often struggling to balance its budget and therefore needed to purchase lower cost food. Smith argues that the typical Pennsylvanian labourer would purchase similarly priced food. Assuming a labourer consumed 3,200 calories daily Smith constructs a diet that provides this amount using proportions from the hospital's records. Smith obtains results similar to those reported by Shammas for New York and Philadelphia almshouses. The average labourer consumed 174.5 lbs of meat annually, 147.2 lbs from beef⁹. As of the mid to late eighteenth century wild game was no longer a major source of meat and it can be further deduced from the analysis of faunal remains that pork and beef were consumed in most places. Beef was usually consumed fresh and pork was often preserved as salt pork (Gallman and Wallis 1992, 241)¹⁰.

There is a much wider range of values for dairy consumption¹¹. Perkins reports that a servant was allocated 27lbs of dairy a year, whereas the poorhouse menus reports annual amounts of 2.6 lbs and 5.5

⁹ This translates to 0.48lbs of meat per day

¹⁰ Fauna is the study of animals in a region. To study faunal remains is to study the skeletal remains of animals in a region.

¹¹ This is mainly due to the poorhouse menus reporting very low consumption levels

lbs of dairy for Philadelphia and New York¹². Finally, Smith reports 20.3 lbs of dairy were consumed annually. These values cover a wide range and are hard to reconcile. Perkins' estimates are not cited and the poorhouse menus most likely represent the lowest percentiles of society. Smith describes a reasonable methodology and uses a sample diet that includes a caloric breakdown. His numbers seem the most appropriate for my purpose. According to Smith 29 percent of calories were acquired through meat and dairy products.

Most analysis indicates that during the second half of the 18th century American Colonists were well fed¹³. Carole Shammas reports that 34 percent of a laborer's wage in Philadelphia during the 1750s was spent on food (Shammas 1980, 174). It is assumed this number refers to a single laborer, who was not supporting a family, because she also reports that in 1762 the average household's expenditure on food was 51.2 percent of their budget¹⁴. Note that the 34 percent proportion for a household's budget is inconsistent with most of the literature.

Mancall & Weiss have calculated that in 1770 per capita food consumption was \$31.21 (Mancall & Weiss 1999, 24).¹⁵ They note that military rations stayed constant from 1770 to 1800. This initial figure does not separate colonists from slaves. In order to obtain an estimate for colonists, they take the value of a slave's food consumption to be three quarters that of a colonist's¹⁶. This number needs to be adjusted further to account for family composition because of the different consumption of women and children. Based on a five-person household with each child eating 60 percent of the father's amount and the mother eating 83 percent, we find the value of a male labourer's per capita food consumption is \$43. This value is similar to the value estimated by David Klingaman who calculates the value of food consumption by a

¹² Dairy is reported in butter equivalents. When litres of milk consumed is also reported it is converted to butter equivalents at 10 litres a pound

¹³ Smith reports on page 164 of "The Material Lives..." various reports of living standards in Colonial America

¹⁴ Luxury food purchases such as coffee, tea and sugar are included in this figure when they are removed other food purchases take up 44.4% of the budget

¹⁵ All dollar values are reported in 1840 U.S. dollars. They obtain this value by calculating food per capita in 1800 using a method similar to the method used by Towne and Rasmussen in "Farm Gross Product". In order to find a value for 1770 they assume that food consumption would have remained constant over the subsequent three decades.

¹⁶ Mancall & Weiss use this approximation to derive their estimate. P. 23 "Was Economic Growth Likely in Colonial British North America?"

labourer in Philadelphia in 1770 to be \$46 (Smith 1979, 171). The estimate by Smith for the menu he created from hospital records is \$39.50 annually or \$143 for the household. In our analysis we combine estimates of food expenditure with Shamma's figure for household expenditure on food to obtain an estimate of income per household. If a family's food expenditure is \$143 and each household spends 51.2 percent of their budget on food, then the household budget is \$280¹⁷.

B. Shelter

In the Colonies two storey homes were becoming popular in the mid-eighteenth century, however the walls were often still made of clapboard, and even the chimney was often made partly of wood (Walsh 1983, 110). Smith has calculated rental costs for a typical Philadelphia labourer to be \$39 for a small unit that housed a family of four. An urban rental unit may have been smaller than 150 square feet, with poor insulation. In many cases a family would take on boarders or share the unit with another family. Housing in the mid-eighteenth century was most often built by the family with little professional help. Most houses were not built well enough to last a full generation (Shamma 1980, 140).

The cost of fuel also needs to be included. Firewood was the major source of fuel and it was used both for heating and cooking. Based on the work done by J.T. Main with probate inventories, Smith has estimated that a labourer's family in Philadelphia would have spent \$30 annually on firewood or \$6 per person (Smith 1979, 178). Mancall and Weiss also incorporate the cost of firewood into their analysis of GDP per capita. They estimate that \$8 per capita was burnt. (Mancall & Weiss 1999, 26)¹⁸

C. Clothing

¹⁷ These values are based on Smith and Mancall & Weiss' values for a laborer's food expenditure

¹⁸ In the comparison the numbers presented by Mancall and Weiss will be used; Smith's firewood is based on a ledger of one man and comes under scrutiny.

My estimate of clothing expenditure in Colonial America is based on several sources. Shammass has done extensive work using probate inventories from Colonial America (and England). Combining her work with 1774 Massachusetts probate inventory data we estimate annual clothing expenditure. Clothing represented 17 percent of the average probate inventory (Shammass 1980, App. II). Assuming that clothing lasted 10 years we can apply straight line depreciation to estimate annual clothing expenditure by an adult. After adjusting for household size we estimate annual clothing expenditure of \$68.¹⁹ An adult male's annual clothing expenditure is put at \$18.²⁰

D. Luxuries

Luxury purchases are put into two categories – edible luxuries such as alcohol, sugar, tea, and sugar and durable goods such as brass, pewter, and jewellery.. In the second half of the eighteenth century, imported rum and home grown cider were the most important sources of alcohol, and by the onset of the American Revolutionary War it was estimated that seven gallons of spirits per capita were being consumed by the drinking-age population (Rorabaugh 1979, 170). Most of this consumption was in the form of rum, therefore we can estimate a value from the wholesale rum price. Our estimate of alcohol consumption is \$16 per adult male²¹. The purchase of luxury food items is also included in Smith's estimated budget for a Philadelphia labourer; he estimates that annually \$6.24 was allocated to sugar, molasses, coffee, tea and chocolate. Luxury purchases for an adult Colonial male total \$43, \$27 excluding alcohol.

The final expenditure by Colonial households was non-food luxury goods. These are semi-durable and durable goods such as linens, bedding, brass, pewter, and jewellery. Records of semi-durable

¹⁹Annual clothing expenditure: $x = \frac{c}{4.5}$ where c is the clothing share of probate inventories (16.8% of \$500.86). We assume the probate represents one individual. Assuming a five person household (may be low) with children requiring 60% of the clothing adults do. Main estimates clothing for a male to cost \$16.27 annually, Smith p.180)

²⁰ J.T. Main estimated annual clothing expenditure by an adult male to be \$16 (Smith p179)

²¹ The estimate used wholesale prices from 1775 and were altered with a 100% mark-up.

and durable goods are in the probate inventories. Among those households in Massachusetts wealthy enough to have been probated, the median inventory was \$501 (Shammas 1980, App. II).²² This value is more than one and a half times average household income. The annual expenditure on bedding and household linen is calculated by amortizing those values over 20 years using the same methodology used to calculate annual expenditure on clothing. This leads to an annual expenditure of \$14.66. Assuming durable luxury purchases were accumulated over the course of 15 years and do not depreciate we arrive at an annual expenditure of \$6.50.

4. *Consumption of Plains Indians*

In the mid-eighteenth century many Native American groups were living in a golden age for their society²³. They had plenty of food, their clothing and shelter were sufficient and trade with whites had given them access to tools, weapons and luxury goods that enhanced their quality of life. Our analysis of Native living standards will focus on the Plains Indians with particular emphasis on the Cheyenne and Assiniboin tribes. The Cheyenne and Assiniboin were semi-nomadic equestrian tribes populating the northern plains in the eighteenth century²⁴.

A. Food

The Plains Indians were hunter-gatherers and they spent most of their time acquiring food. The men's greatest responsibility was hunting and the women were responsible for supplying the non-meat part of the diet and processing animal hides. Edward Hoebel, an anthropologist who has written extensively on the Cheyenne people, describes their land as follows,

²² Probate inventories contained a wide variety of items, typically it contained all household items of some value, ie clothes, furniture, jewellery, linens, bedding etc.

²³ Carlos and Lewis report that sub-arctic Natives may have been living in a golden age in the first seven decades of the eighteenth century p. 183. The factors that contributed to their standard of living were enjoyed by many Native groups in this period.

²⁴ Northern Plains tribes stretched into Southern Manitoba and Saskatchewan. The major trading post utilized by the Northern Plains tribes was Fort Union, located on the Upper Missouri near the border of North Dakota and Montana

‘a bountiful land of millions of bison and antelope easily taken when the season is right; a land of roots, seeds, and berries for those who know where to find them; a land where a person can get a full, satisfied belly on rich meat balanced with a variety of wild vegetables. But it is still where starvation is a specter never far off’

The Plains Indians were one of the tallest groups in the world. This suggests they ate a healthy diet and consumed calories far above a subsistence level. Their diet focused on big game. Buffalo was the predominant source of nutrition, but antelope, elk and deer were also eaten (Denig 2000, 126). A successful buffalo hunt could yield as many as five buffalo for each hunter (Denig 2000, 139).²⁵ In times when large game was not available, a wide range of small game was hunted including carnivores such as fox and wolves. In dire times, a tribe might resort to eating their dogs and horses, however this was uncommon (Denig 2000, 115).²⁶

The diet of the Indians was complemented with a variety of wild roots including the Indian turnip and the red turnip which could be preserved.²⁷ Fruits and berries such as the chokeberry were collected and used in pemmican, and dozens of other roots, stalks and berries were collected as flavoring for soups and boiled meat dishes (Hoebel 1978, 65).

Carlos and Lewis assume that an adult male hunter/gatherer living in Canada’s Hudson Bay region consumed an average of 3,500 calories per day, and that 80 percent came from meat sources. The Plains Indians would have likely had a similar caloric intake²⁸. Bison rather than moose was the principal meat source and the vegetation consumed varied as well, however both groups consumed a diet that was basically similar. The Plains Indians hunted antelope, elk, deer, and bear in addition to bison. They hunted

²⁵ A successful buffalo hunt could take two or three days to skin and butcher the animals.

²⁶ Denig (p. 115) describes times of feast when an Indian man may eat up to 20 times during the day and night, but other times the tribe would go 8 to 15 days without eating anything. Despite hunting a great abundance of food at times it seems the Indians spent little effort smoothing their consumption

²⁷ The Indian turnip (Cheyenne name) is also known as the Prairie turnip (Assiniboin) and more universally ‘pomme blanche’

²⁸ The plains had slightly shorter winters, but they winds contended on the plains could be treacherous year long. Both groups lived physically demanding lifestyles and ate a diet rich in protein. The average height of the Plains Indians suggest they ate as well as Indians in the sub-arctic. The soils of the plains were more fertile than the Canadian shield and this may explain the greater average height of Plains Indians.

year-round and during periods of affluence had numerous feasts (Denig 2000, 115).²⁹ In the summer, meat was preserved by cutting it into long thin strips and drying it in the sun, and in winter the meat was smoked in their tents.

In order to consume 80 percent of their calories from bison, an adult male would need to eat 2.75 pounds of bison daily³⁰. At 1775 wholesale Philadelphia, the value of 2.75 pounds of meat consumption daily is \$83 per year. The cost to a household is \$301.³¹ The value of the meat consumed annually by a Native family is equivalent to the entire budget of a Colonial family.

B. Shelter

The teepee was the shelter of choice for Natives inhabiting the plains³². It provided warmth and protection from the wind in the winter and ventilation in the summer. Because of the teepee's design it is stable even in strong winds. It can be quickly dismantled and re-assembled. Thus it was ideal for the nomadic lifestyle of the Plains Indians.

A large teepee consisted of 15 to 20 tanned buffalo hides sewn together and drawn over 14 to 30 pine poles. A teepee would house between eight and sixteen Natives (DeMallie 2000, 700). The Plains Indians, unlike the Natives of the sub-arctic, used higher quality hides in the construction of their teepees. The hides needed to be strong and well tanned in order to withstand the winds of the plains and keep the teepee waterproof³³. The design of the teepee covering was done by an expert lodge maker who cuts all the pieces and marks them for sewing. She was rewarded for her efforts with a present. The sewing of the

²⁹ Denig reports that Indian males sometimes ate from 3 to 10 hours straight with barely a break and demonstrate no ill effects afterwards (p. 115)

³⁰ According to the USDA one pound of bison has 1012 calories.

³¹ Based on wholesale Philadelphia meat prices in 1775 and adjusted by a factor of 1.5 to reflect retail value. Household expenditure is derived assuming a family of five with an adult woman consuming .83 and children .6 of an adult male.

³² Ethnographer accounts of Cheyenne, Crow, and Assiniboin all name teepee's as the form of shelter.

³³ The tanning of the hides is a big process and help from the tribe is needed to complete the tanning process.

hides required many women and is conducted over the course of an entire day. The woman whose lodge was being built provided a feast for the women helping her with the sewing (Hoebel 1978, 67).

Perhaps the most valuable component in the construction of a teepee is the labor that is required in tanning, cutting and sewing the skins. However for simplicity we will assume the value of the housing is only the price of the skins used in construction. Assuming a teepee requires twenty buffalo skins and houses sixteen individuals the value of per capita housing is \$5.60.³⁴ The cost of fuel is an important consideration in the cost of Native housing, and it likely cost as much to heat the teepee as to construct it, therefore the annual value of housing per capita is put at \$11.20.

C. Clothing

The Assiniboin wore everyday clothing for summer and winter, but also possessed a variety of outfits for rituals, wars, and feasts. Assiniboin warriors took a great deal of pride and elaborately decorated their ceremonial dress. One of the components could be a war-eagle feather cap, which alone was worth two horses. Only mounted warriors went to such great lengths to decorate their ceremonial dress, but all Assiniboin possessed fancy dress (Denig 2000, 191).³⁵ Their everyday wear is far simpler; in summer a male might wear a cloth breech, cotton pants, a calico shirt, white blanket, muskrat cap and moccasins (Denig 2000, 192).³⁶ In winter clothing made of buffalo hides was preferred for its warmth and durability. A typical outfit consisted of a buffalo robe coat with the hair turned inside and another robe over top, cap and mittens with hair turned inside, hide leggings, moccasins and snowshoes. The summer outfit described would trade for seven buffalo hides at the trading post and the winter outfit requires three and a half hides to make³⁷. A basic summer outfit made entirely of skins needed two and a half buffalo

³⁴ A teepee covering is assumed to last 12 months. The skins are valued at \$3 each and spread over the number of inhabitants.

³⁵ All Assiniboin possessed dress for special occasions if they could afford it, however the mounted warrior's dress was far more elaborate than most Assiniboin. Denig p.191-95

³⁶ Denig describes 7 of the most common summer outfits. The outfit described falls in the middle in terms of value.

³⁷ Denig was a representative of the American Fur Trade who worked out of Fort Union. The value estimates are his, based on the prices at Fort Union.

hides and a winter outfit required three and a half skins. Assuming an adult male owned only these outfits and each outfit was replaced annually the value of his clothing was \$18 (Denig 2000, 191).

A mounted warrior's dress was much more valuable than the typical outfit worn by an Assiniboin. Denig estimates that the components of a warrior's nice dress wear would trade for upwards of \$189 at the trading post; to the Assiniboin the components of the dress were worth more than six horses. Because of the rarity of some decorative pieces and the time required to decorate the outfit, a warrior would part with it only in times of great distress (Denig 2000, 195).³⁸

D. Luxury Goods

Fort Union was a trading post located on the upper Missouri. Established in 1828, it was a major trading center for the Northern Plains tribes, and was prominent during the period of westward European expansion. The bison and other pelted animals provided an opportunity for the Plains tribes to benefit from the fur trade. The Plains Indians traded for mainly practical items. They acquired guns and ammunition, metal tools, flints, clothes, and even horses³⁹. Luxury items were traded at the post. Many of the luxury items were for decorating clothing; pigments such as vermilion were used to dye hides, while beads and brooches were also important.

There is limited information on the value of trade occurring at Fort Union, however the descriptions of items purchased are similar to those reported by Carlos and Lewis. Assuming that per capita trade in luxuries at York Factory was equivalent to the trade at Fort Union each Native consumed

³⁸ A warrior may sell his dress to recuperate from a property loss for the betterment of his family, Denig p.195

³⁹ Appendix E of "Historic Furnishing Report" released by the Fort Union Historical Site is a summary of Pierre Chouteau Jr. and Company's "Accounts with Individual Indians, 1846-1848". Hoebel and Denig also make references to these trade items in "The Cheyennes Indians of the Great Plains" and "The Assiniboin" respectively

between \$3.30 and \$6.20 in luxuries each year⁴⁰. A notable absence in Fort Union trade reports is mention of alcohol, indeed references to alcohol in ethnographer accounts are rare⁴¹.

5. *Consumption of American Colonists, Plains Indians and English Workers: A Comparison*

The wage used to compare an English worker's with a colonist's is that of a collier⁴², who in the later eighteenth century earned in the 55th percentile of English society. The various sources used to derive the colonist's consumption bundle make it difficult to determine how representative the colonist is⁴³. The salary of a collier translates to \$195 and our estimate for a colonist is \$280⁴⁴.

A. Food

In the eighteenth century, getting enough to eat was a major concern among some of the lower classes of society. This was true of low wage English workers and low-wage colonists. In terms of prepared dishes, the English and Colonists ate similarly. American recipes were often adjusted versions of British recipes, furthermore, the types of meat consumed were similar and both groups received over 50 percent of their calories from wheat and bread. However the colonist's diet was much more desirable in

⁴⁰ Carlos and Lewis found per capita consumption of luxuries to be 2 made beaver (2 high quality beaver pelts). Assuming Northern Plains Indians were as successful with buffalo (2 hides per capita traded) using Denig's price of \$3 a hide then around \$6 per capita was traded at Fort Union.

⁴¹ There are some references to famous alcohol induced outbursts however per capita consumption seems minimal

⁴² Carlos & Lewis used the salary of a non-farm common laborer in their analysis, however I feel it is more appropriate to use the salary of a working class that is earning closer to the median level in society because the upper limit of the value of the Colonist's diet is obtained from Mancall & Weiss who use GDP per capita to obtain their food value estimate. A collier was still considered a poor worker so the budget work by Feinstein is still appropriate to use in the comparison. The effect of using the collier's salary to construct purchase amounts will only affect our analysis by proportionately increasing the monetary value of each category of the English workers budget.

⁴³ Most accounts used refer to colonist's of humble means, however using probate inventories in our analysis implies a certain degree of wealth

⁴⁴ Adding the individual components of consumption up for the colonist produces a budget 5% higher than the estimated income. This does not change any part of the analysis. The discrepancy is due to the independence of the sources used.

terms of meat and dairy consumption, see Table 1. The English devoted only 14 percent of their budget to meat and received only 5 percent of their calories from meat whereas the colonists devoted almost a third of their budget to meat and received 18 percent of their calories from this source. The caloric estimates prepared based on Feinstein and Smith suggest a similar story with dairy intake, Colonists spent 19 percent more on dairy relative to the English.

As Carlos and Lewis report, the English elite consumed around 50 percent of their calories from meat sources. We can conclude that given the choice the English would adopt the colonist's diet. We also estimate that colonists consumed 500 calories more per day and 17 grams more protein. An adult male colonist was consuming at least a half pound of meat per day, often fresh, where an English worker would have consumed less than half of that amount.

These dietary differences can be attributed to the household budget. Feinstein estimates that a poor laborer in England spent 69 percent of their budget on food whereas Shammass estimates that number to be 51.2 percent for a Massachusetts' labourer during the same period (Feinstein 1998, 635).⁴⁵ Either due to higher wages or the relative cost of food (most likely both) a colonist's family was able to eat a much better diet.⁴⁶

Native's food consumption outweighed that of the colonist and even more so that of the English worker. Using wholesale Pennsylvania prices, the Native diet totalled \$83 annually, double that of the colonist⁴⁷. The Native diet was high in protein and complemented with an array of vegetable products. Their biological standard of living implies a diet rich in nutrients.

⁴⁵ Without luxury food items, English workers spent 62.1% and with them 69% on diet. Colonists were 44.4% and 51.2% respectively.

⁴⁶ The higher consumption of meat and dairy products in Colonial America was in part due to the frequency of owning livestock (Gallman and Wallis 2002, 225)

⁴⁷ The discrepancy would be greater still if retail prices were available. Retail mark-ups are likely 100% suggesting that the Native diet was actually worth four times as much as the colonist's diet

Table 1. Diet Comparison: American Colonist and English worker

	American Colonists				English Workers		
	Budget Share (%)	Daily Calorie Intake	Percentage of daily calories		Budget Share (%)	Daily Calorie Intake	Percentage of daily calories
Wheat Flour	31.8	1600	54.8	Bread	22.2	555	22.2
Cornmeal	1.8	199	6.8	Wheat Flour	30.0	775	31.0
Rice	1.7	68	2.3	Oatmeal	14.4	572	23.0
Bran	1.7	110	3.8	Potatoes	5.6	249	10.0
Beef	29.1	528	18.1	Beef	3.3	29	1.2
Mutton				Mutton	3.3	29	1.2
Pork				Pork	7.8	67	2.7
Potatoes	0.5	7	0.2	Milk	5.6	110	4.4
Turnips	1.2	12	0.2	Butter	4.4	65	2.6
Butter	12.7	117	4	Cheese	3.3	49	2.0
Milk	19.5	281	9.6				
	100	2922	100		100	2500	100

Sources: Smith, Billy G. "The Material Lives of Laboring Philadelphians, 1750-1800" *William and Mary Quarterly*, Volume 38, Issue 2

Feinstein, Charles H. "Pessimism Perpetuated: Real Wages and the Standard of Living in Britain, During and After the Industrial Revolution" *Journal of Economic History*, Volume 58, Number 3

B. Shelter

In terms of budget allocation English workers and Colonists were spending similar amounts. Feinstein has estimated that low wage English workers were allocating 10 percent of their budget to rent and another 5 percent to fuel. Using Smith's estimate for housing value and Mancall and Weiss' fuel estimate, housing and fuel take up 17 percent of the household's budget⁴⁸. The low value of housing supports the hypothesis that Colonists lived in inferior houses and needed a high expenditure on fuel. Fuel costs were high for two reasons: costs increased as the forests around heavily populated areas became depleted and a large amount of wood was required to heat homes, which had poor insulation. colonists spent more money and a greater proportion of their budget on fuel and housing, but it is unclear whether they lived more comfortably than the English due to the weather. By our estimates the value of housing consumption is \$47 for colonists and \$48 for English workers.

The quality of housing enjoyed by a Plains Indian was most likely high relative to most Native groups of the period however their housing was still quite primitive when compared to the Europeans and Americans⁴⁹. The tepee needed to be taken down and re-assembled to easily accommodate the semi-nomadic lifestyle of the Plains Indians. Because of its temporary nature, the value of the Plains Indian's housing was less than one quarter that of the colonist's, and this estimate accounts for fuel.

C. Clothing

The lower class households of Britain and Colonial America had similar relative expenditures on clothing. According to budget work by Feinstein, English households spent 6 percent of their income on clothing and according to our estimates colonial households spent slightly more at 8 percent. The quality

⁴⁸ Colonist rent is capitalized over 10 years (Carlos and Lewis capitalize English rent over 20, however we use a lower value based on the housing accounts for the time). Housing costs are adjusted to allow for seven people per household (reflective of Smith's estimates)

⁴⁹ The teepee was a reliable structure that was both waterproof and windproof.

of clothing in the Northern colonies may have been higher than in England in order to withstand the harsh winters on the Atlantic coast. The higher income level of colonists leads to a clothing estimate of \$18 which compares to \$12 for an English worker.

The Plains Indians invested a considerable amount of time in their garments. Assiniboin women were skilled tailors and Assiniboin warriors went to great lengths to acquire a ceremonial dress⁵⁰. If we only include the value of the skins that make up seasonal clothing the value of clothing for an Assiniboin male was \$18. Thus, the value of clothing for an Assiniboin and a colonist are similar.

D. Luxury Goods

The preferences among colonists and English workers were quite similar with both spending a considerable portion of their income on consumable luxury items: alcohol, coffee, tea and sugar. Bedding and linen, brass, pewter and jewellery rounded out the rest of the household's purchases. Including alcohol 17 percent of the English worker's budget was spent on luxury goods; for colonists the share was 22 percent. The share of English expenditure on food-type luxuries was similar to the colonists. However the colonist consumed almost twice the alcohol (and had an entire category of luxuries that the English worker did not).⁵¹ The value of the colonist's luxury consumption was \$42 including drink and \$27 without; the English worker consumed \$15 and \$7, respectively⁵².

Luxury purchases were a much smaller part of Native lives than of the Colonists. For Natives of the northern Plains luxury purchases were most likely for one of two reasons. First, to make life easier through the purchase of tools, weapons and horses, and second, to acquire decorative items that were unavailable. Depending on the conversion used for a buffalo hide, native purchases were worth either \$3

⁵⁰ As evidenced by the almost \$200 price tag on some warrior's outfits

⁵¹ Feinstein's work on budgets reveals no expenditure on durable luxuries.

⁵² Alcohol is included in the Colonist – English model comparison

or \$6. These values are far less than the luxury purchases of the colonists. In fact the value of a colonist's luxury purchases may have been greater than ten times those of the Plains Indians.

6. *Comparing Living Standards: A Utility Based Approach*

The model used to compare living standards is from Carlos and Lewis and appeared in chapter seven of their book, "Commerce by a Frozen Sea"⁵³. The model incorporates food in two ways. First food is incorporated through a binding calorie constraint; the idea being that without sufficient food survival is not possible. Second, food enters the utility function, the motivation being that a more preferred diet leaves an individual better off. The diet is assumed to be made of two types of food: meat (high quality) and grain (low quality). The calorie constraint is normalized to one, and meat or grain is defined in terms of those normalized calorie units.

$$1. \quad 1 = g + m$$

g = proportion of calories consumed as grain (non-meat) *m* = proportion of calories consumed as meat

The utility function is Cobb-Douglas and assumes a diminishing marginal rate of substitution between grain and meat:

$$2. \quad u = (g + a \cdot m^\alpha) \prod_{i=1}^n c_i^{\beta_i}$$

α, β_i, a are all utility parameters. α is assumed to be 0.5 for all parties. β follows from budget shares and a is derived⁵⁴.

⁵³ The model description is based heavily on appendix D of 'Commerce by a Frozen Sea'

⁵⁴ α is assumed to be 0.5 for both Natives and Colonists. a satisfies $[m = (a * \alpha)^{\frac{1}{1-\alpha}}]$ where m takes the optimal value, 0.5 for English workers and Colonists and 0.8 for Natives. c_i represents the consumption of good i (eg. Shelter, clothing and luxuries).

From equation (1) and (2) it follows that:

$$3. \quad u = (1 - m + a \cdot m^\alpha) \prod_{i=1}^n c_i^{\beta_i}$$

The income constraint can be written as:

$$4. \quad Y = 1 + (p_m - 1)m + \sum_{i=1}^n p_i c_i$$

The optimization problem is given by:

$$5. \quad \max_{m, c_i} U = (1 - m + a \cdot m^\alpha) \prod_{i=1}^n c_i^{\beta_i} + \tau(Y - 1 - (p_m - 1)m - \sum_{i=1}^n p_i c_i)$$

Taking first order conditions gives rise to the following:

$$6. \quad \frac{a \cdot \alpha \cdot m^{\alpha-1} - 1}{1 - m + a \cdot m^\alpha} = \frac{\beta_k (p_m - 1)}{p_k \cdot c_k} \quad k = 1, \dots, n$$

$$7. \quad \frac{a \cdot \alpha \cdot m^{\alpha-1} - 1}{1 - m + a \cdot m^\alpha} = \frac{\beta_k (p_m - 1)}{p_k \cdot c_k} \quad k = 1, \dots, n$$

If the price of meat is greater than or equal to the price of grain ($p_m \geq 1$), then the consumption of meat lies between zero and $(a \cdot \alpha)^{\frac{1}{1-\alpha}}$. In that range, the left hand side of the equation is decreasing in m , implying that an increase in the price of meat leads to a decline in meat consumption. Also, an increase in expenditure in any of the other goods categories implies an increase in expenditure on meat as well.

Finally, meat is affected by a normal income effect.

We will conduct two analysis' to compare well being across groups. The first is a comparison of relative food consumption, acquiring food was by far the largest component of eighteenth century budgets and the most important consideration for survival. We compare the value of food consumption given by the utility function:

$$8. \frac{F^c}{F^x} = \frac{1 - m^c + a(m^c)^\alpha}{1 - m^x + a(m^x)^\alpha}$$

$F^{c,x}$ represents the utility from food consumption (c = Colonists and x = Natives or English), and $m^x = (a \cdot \alpha)^{\frac{1}{1-\alpha}}$ is optimal meat consumption (when comparing with Natives) and takes English values when the Colonist - English relative consumption is calculated. Colonist's meat consumption at 0.317 was still considerably below 0.5, but much higher than the English worker's at 0.139. The relative value of the Colonist's food consumption to the English workers is 1.06. The relative food consumption of the Colonist to the Native is 0.99 with Colonist weights and 0.82 with Native weights.

The second comparison is the utility level of the respective groups. Taking the ratio of the utility functions of the two groups gives us the following:

$$9. \frac{U_c}{U_E} = \left(\frac{1 - m_c + a \cdot m_c^\alpha}{1 - m_E + a \cdot m_E^\alpha} \right) \left(\frac{C_1^c}{C_1^E} \right) \left(\frac{C_2^c}{C_2^E} \right) \left(\frac{C_3^c}{C_3^E} \right)$$

First the Colonist – English relationship will be determined. The relative values are given as follows:

Table 2: Values of Consumption and Utility Comparison: Colonist – English Worker⁵⁵

	Shelter (β)	Clothing (β)	Luxuries (β)	Utility Ratio (C/E)	Food Comparison
Colonist	47 (0.2)	18 (0.06)	42 (0.17)	1.29	
English	48 (0.135)	12 (0.054)	15 (0.152)	1.26	
Colonist/English	0.98	1.5	2.8		1.06

The preferences of the Colonist and the English worker are quite similar and therefore the utility ratio is quite similar regardless of whether Colonist or English weights are used.

⁵⁵ In parentheses is the calculated value for β, satisfying the first order condition $\frac{a \cdot \alpha \cdot m^{\alpha-1} - 1}{1 - m + a \cdot m^\alpha} = \frac{\beta_k (p_m - 1)}{p_k \cdot c_k}$

Table 3: *Values of Consumption and Utility Comparison: Colonist - Native*

	Shelter (β)	Clothing (β)	Luxuries ⁵⁶ (β)	Utility Ratio (C/E) – high	Utility Ratio (C/E) – low	Food Comparison
Colonist	47 (0.2)	18 (0.06)	27 (0.17)	1.7	1.92	0.99
Native	11.2 (0.08)	18 (0.13)	3 [6] (0.04)	0.98	1	0.82
Colonist/Native	4.2	1	9 (4.5)			

For the comparison of the Colonist male and Native male the weight preferences used drastically change the results. Using the low estimates for Natives and using Colonist preferences the utility ratio is 1.98. Compared with using high estimates and native weights where the utility ratio is equal to one. We can interpret this as follows: under no circumstances will the Colonist choose the Native consumption bundle, he strongly prefers the levels of consumption and diversity of his bundle. However the Native male is indifferent between the Colonist bundle and his own when using the low estimates of Native consumption. Further, the ratio of 0.98 (when using high estimates) would suggest that only a minor tweak in the Colonist consumption bundle would make the Native indifferent between bundles.

7. *Conclusions*

This essay investigates the living standards of Colonial Americans, English workers, and northern Plains Indians in the mid-eighteenth century. First, I reviewed some of the literature on the biological standard of living including evidence on heights of the three groups. Second, the consumption of each group is studied in terms of four categories: food, shelter, clothing, and luxury goods. Finally, a utility-based approach is applied to compare relative living standards.

⁵⁶ Luxury purchases do not include alcohol when comparing to Natives due to a lack of data regarding Native luxuries.

The findings on biological standard of living are based mainly on the work of Komlos and Steckel who have both written extensively on the subject. The heights of American soldiers at the onset of the Revolutionary War were a full six centimetres greater than the heights of the British soldiers, implying that the health of American Colonists was far superior to the health of their English counterparts. Height data for the northern Plains Indians for the mid-eighteenth century is not available, however Franz Boaz conducted an extensive anthropological survey of the Plains Indians in the nineteenth century and is used in our analysis. At the time of Boas' survey, the Plains Indians were possibly the tallest group of people in the world. Their diet was high in protein, anchored with a high consumption of large game, and complemented with a selection of vegetables. The height of an adult Native male was very similar to the height of an American soldier at the onset of the Revolutionary War. The evidence suggests that the American Colonists and Plains Indians had a high biological standard of living in the mid eighteenth century⁵⁷.

The second part of our analysis examines the consumption levels of the three groups, revealing further evidence of a high standard of living in the New World. In every category of consumption (with the possible exception of housing) American Colonists enjoyed a higher level of consumption than their English counterparts. In particular the Colonial diet was vastly superior; it contained 700 calories more per day and had more than double the meat and dairy of the English diet. The English worker would have preferred the consumption bundle of the Colonist. The Plains Indians had very different preferences than the English or Colonists. They desired less diversity in their consumption bundle and placed a high importance on meat in their diets. However despite the very different preferences of the Colonist group and the Native group, under certain assumptions the Natives may have preferred the consumption bundle of the Colonist. There is little doubt that Colonists in the mid-eighteenth century were enjoying a high standard of life. In terms of both the economic and biological standard of living they were among the best off in the world.

⁵⁷ The Native style of life had not undergone major changes from the eighteenth to the nineteenth century and I am assuming average height would have been similar in the eighteenth century to nineteenth century levels.

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