

A New Population Theory:
Human Security as a determinant of fertility rates

International Population Policy:
Family Planning - one side of the story
'A Revised Perspective'

By
Melanie Shane St. James, MAIPA

Capstone Seminar May 7th 2000
Submitted to Professor Gil Gunderson
Monterey Institute of International Studies

(Updated January 11, 2013)

***Abstract:** With the aim to improve the global governmental and civil society based population policy approaches, this paper goes beyond addressing cognitive drivers of fertility rates to explore the relationship between poverty and human security, and the influences of human survival instincts. It responds to deeper questions, "why or what causes these social-economic factors to exist?" and "for what biological, evolutionary purpose?" It presents a theory concerned with environmental influences of human insecurity on fertility rates and population growth, beyond influences of contraceptive prevalence or the cost of education on reproductive behavior.*

Contents

- *Statement of Purpose*

Part One

1. *Introduction*
2. *Generally accepted fertility theories - The Population Cannon*
 - 2.1. *The Population Reference Bureau's (PRB) Population Handbook, 4th International Edition*
 - 2.2. *Pop Council Models- Bongaarts' slides:*

Part Two

3. *The St. James Theory - a new security based view on the determinants of fertility rates*
4. *Theoretical Concepts and Scientific Foundations*
 - 4.1. *Zoological studies - applied evolutionary biology*
 - 4.2. *Homo-sapiens Specific Reproductive Implications*

Part Three

5. *The case of one country - Can Senegal escape a Malthusian forecast?*
6. *Original field research in the region of Casamance, Senegal- Summer 1999*
 - 6.1. *General Indicators of Target Population:*
 - 6.2. *Regional juxtaposition - geographic & cultural resource politics*
 - 6.3. *Regional economic and agricultural prospects*
 - 6.4. *40 Interviews "What are your main reasons for having children?" 1st to 4th*
 - 6.4.1. *Methodology*
 - 6.4.2. *Interview results - data summary*

Part Five

7. *Theoretical Conclusions- Malthus was shortsighted!*
8. *Global Implications and Recommendations "broadened responsibility & hope"*
- 9.1 *The ICPD framework*
- 9.2. *Debt Relief & Human Security*

- *Appendix one:*
 - *A.1. Further research required to support the St. James Theory*
 - *A.1.2 Part one- Extended academic analysis*
 - *A.1.3. Special case studies / out-layers*
 - *A.1.4. Data analysis plan - required results*
 - *A.1.5 Part two- clinical studies: the burden of proof*

- *Appendix two*
- *Policy analysis puzzle*
- *Bibliography*

Statement of Purpose

The purpose of this Capstone paper is to advance theory on the determinants of human fertility rates and thus challenge the current global paradigms that population policy is regarded with. In particular it will introduce a new set of determinants based on environmental and human security factors. In identifying an alternative view of what causes population growth, this paper seeks to discover how this revised perspective would transform global population policy. Current population policy paradigms within the context of the 1995 International Conference on Population and Development in Cairo will be reviewed briefly, and discuss alternate policy approaches.

While the statistical data and other research presented in this paper will provide a theoretical framework for a human security based perspective on fertility rates, the author and researcher does not accept the burden of scientific proof. The research and supporting evidence presented here is intended to invoke an argument, stimulate debate on a newly introduced theory, and convince some of its veracity. This new view is concerned with the factors that drive fertility rates, both behaviorally and biologically.

This new concept and approach will circumvent the inherent perspective set fourth in the cannon of current and past reproductive research so commonly documented in textbooks, and hundreds of papers. There has been repeated analysis of the social-economic and proximate determinants of fertility rates in various societies throughout the world. They follow an identical route to understanding the phenomenon of childbirth with out delving into the essential questions

to finding solutions such as "why or what causes these social-economic factors to exist?" or "for what biological, evolutionary purpose?"

The ultimate objective of this paper is to improve the global governmental and civil society policy making approach and practices related to population policy. And while organizations such as USAID, Planned Parenthood International or UNFPA come most immediately to mind as appropriate targets for policy analysis in this paper, this theory is concerned with environmental influences of human insecurity on fertility rates and population growth. It is not concerned with the influences of contraceptive prevalence or the cost of education on reproductive behavior.

Beyond the proposed system, social factors proposed here, there is indeed a desperate, unmet need for universal access to family planning, particularly throughout the world's poorest nations. And in their efforts to meet that need, family planning organizations must continue and increase their present course of action. Targeting family planning organizations would suggest that the responsibility in responding to this new theory belongs to them. It may also suggest that their present course of action be flawed. Not only is family planning one critical and proactive component in facing the global population challenge, but it ensures an inalienable human right in providing reproductive choice and sexual education. Hence, in presenting a new theory that may affect population policy, the only analysis to be made of global family planning organizations here is that they are grossly under-funded.

The reader shall now observe how this new perspective on population growth implicates a broader scope of organizations with diverse objectives in reconciling the population challenge.

1. *Introduction*

Why does the independent variable life expectancy have a greater influence on fertility rates than that of religion or contraceptive prevalence? And why is fertility more highly correlated with female life expectancy than male life expectancy? What are the environmental, psychological, emotional and human security influences on human reproductive cycles? For example, a status quo study acknowledging that the age of marriage contributes to fertility rates in South Eastern India presents little more than a situational observation. How does this information bring us; policy makers, scholars or kitchen table philosophers a deeper understanding of the subject and contribute toward positive policy revisions? A human security approach takes the question of causality a step beyond culture and economics in seeking the evolutionary origins and the driving force behind fertility rates. This will be attempted by incorporating the science of evolutionary biology, zoology and anthropology into the science of social research.

2. **Generally accepted determinants of fertility theories - *The Population Cannon***

Before presenting a new model of fertility causation, it is necessary to briefly review the cannon of currently accepted and most common theories, models and concepts on fertility rates. When discussing the determinants of human fertility rates, either social-economic factors or proximate determinate factors dominate the issue.

2. 1. The Population Reference Bureau's (PRB) Population Handbook, 4th International Edition -

"A guide to population dynamics for journalists, policymakers, teachers and students of demographics" describes the most widely accepted model (while quite simplified) of proximate (not socially or economically oriented) fertility determinants in the field. According to PRB, the factors affecting fertility include-

1. Percentage of Women in Sexual Union- often calculated by finding the number of women who are of childbearing age and are legally married.
2. Percentage of Women who are Breast-feeding- helpful in calculating the number of women who are at risk of pregnancy, because exclusive breast-feeding of a child can lengthen the time before menstruation resumes.
3. Contraceptive Prevalence Rate- is the number of women of reproductive age who are using contraception per 100 women of reproductive age.
4. Abortion Rate- equals the number of abortions per 1,000 women of reproductive age in a given year.
5. The Abortion Ratio (not to be confused with abortion rate) - the number of given abortions per 1,000 live births in a given year.

These proximate determinants may be observed and calculated cross- culturally in any given society. Social-economic factors are culturally based situational factors that tend to influence proximate determinants, such as prevalence of breast-feeding or the abortion ratio. These factors will vary greatly from one social-economic setting to another.

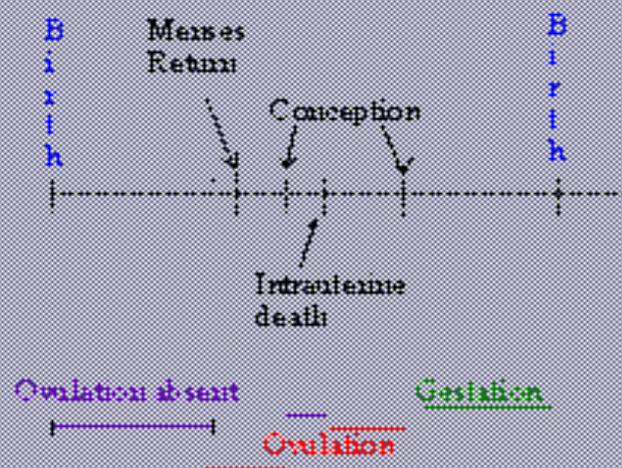
2. 2. Models- Bongaarts "Why high birth rates are so low" *Population and Development Review 1 (1995): 289-296*

- ***These slides point out key principles and underlying assumptions of the general determinants of fertility rates theories.***

Highest fertility

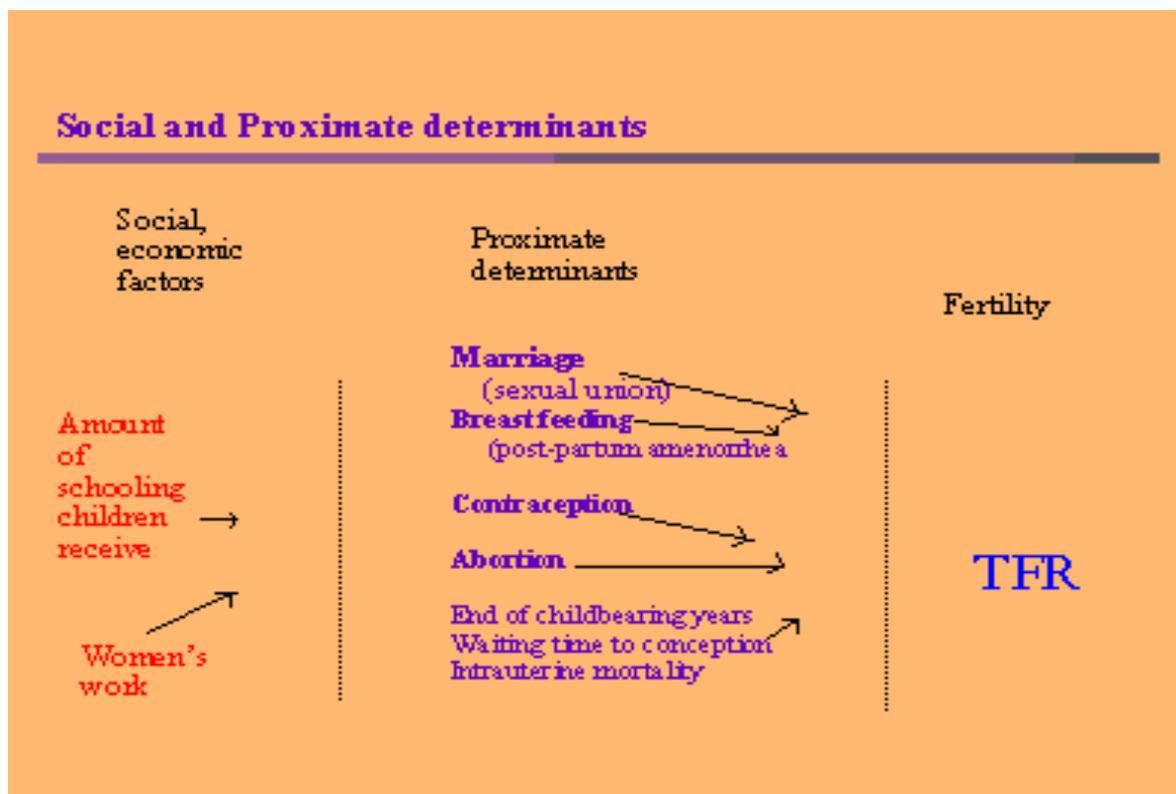
- Hutterite population: CEB = 8.9
- Theoretical maximum: more than one child a year during the reproductive years (15-45 or 30+)
- Note: evolutionary advantage comes from maximizing offspring that *survive to reproductive age* .. this does not imply maximum reproduction
- All societies have typical behaviors that limit reproduction in favor of child survival

Components of a birth interval



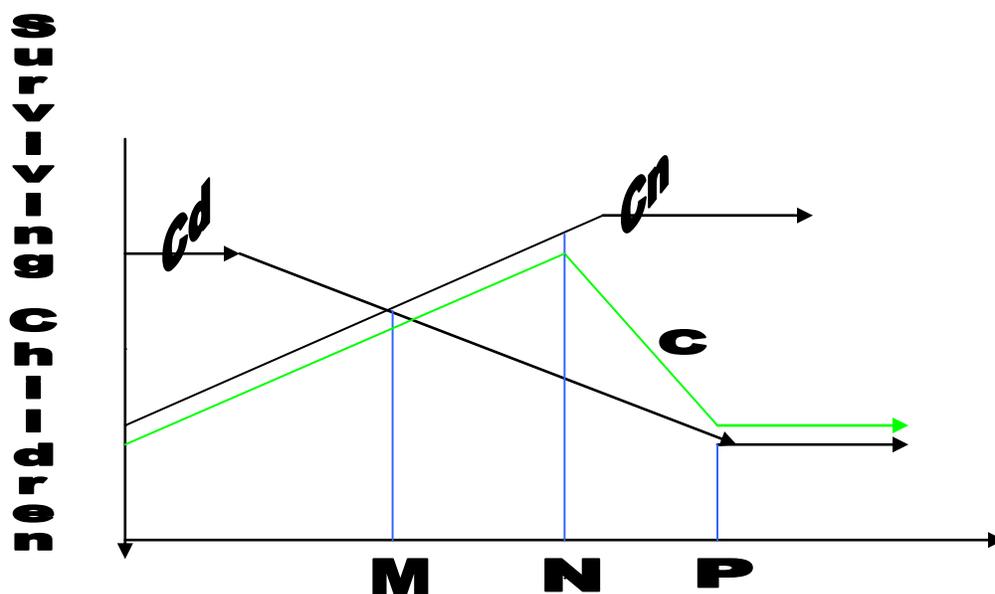
In reviewing the slide below, compare this model's assumption that fertility determination begins with social and economic factors with these fundamental principles of the proposed Human Security based model of fertility determination:

1. *Determinants of fertility begin one step further back- before social or economic determinants. Causality does not begin with cultural and economic factors.*
2. *Culture is a human behavior pattern adapted by a population living in common environment to insure their greatest odds of group survival.*
3. *Economic factors represent levels of human security ~ the greater economic security one has the more they feel generally secure ~ economic security = confidence in survival*



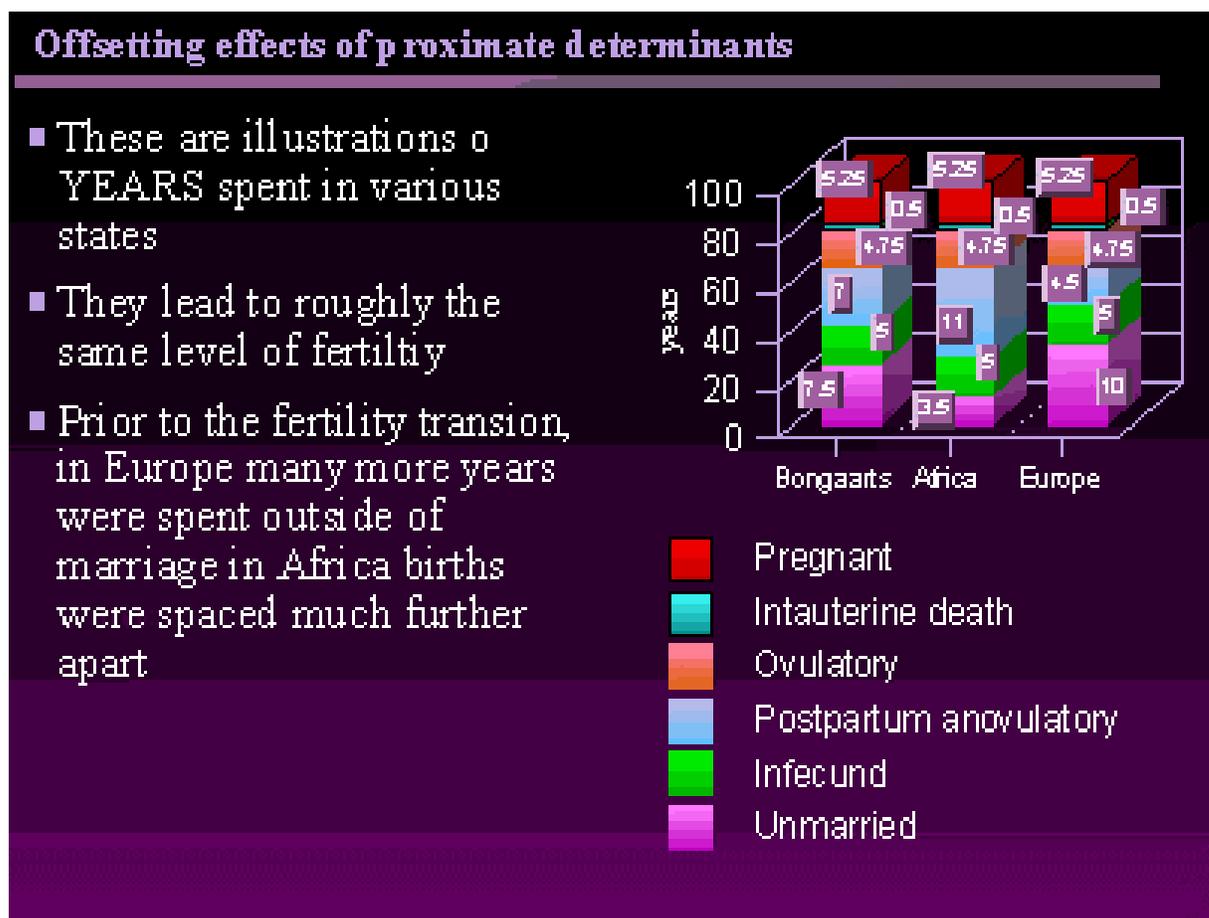
2.3. *Dick Easterlin: Transformation of Social Economies, Division of Labor - Costs and education model*

Dick Easterlin's model focusing on socio-economic factors demonstrates how modernization results in an overall decline in fertility rates. He points to the economic costs related to a modern transition, specifically costs of education in modern societies. Concurrently the economic benefit children may represent in agricultural societies is diminished.



Supply (Cn), Demand (Cd), and Actual Family Size (C) are associated with modernization. The three key stages drawn here include: Modernization (M) -marking traditionally high fertility rates while advances in public health foster high population growth; Newly modernized (N) -when a shift towards fewer children begins to occur; and post-modern (P) -when fertility rates have leveled out to replacement level ~2.2 children per family or less.

- *Here, Bongaarts compares average sub-Saharan Africa's fertility rates today with those of Western Europe before the fertility transition of modernization occurred. While different cultural practices were (and are) taken to achieve a certain family size, when these two societies were at comparable levels of development and security, they maintained roughly equal fertility rates.*



3. *The St. James' Theory on Population Growth*

3.1. A new model of the determinants of fertility rates

For decades, experts have argued about whether poverty is a cause or a symptom of high fertility rates, and multi-country studies have produced no evidence that population growth is the cause of poverty.¹ Rather, the evidence underscores the complexity of the relationships and suggests that high fertility is a symptom as well as a cause of poverty.² This research attempts to answer the question "why does high fertility transpire to be a symptom of poverty?" Or, "what is the interconnected nature of the two social elements?" Why is it so common that parents seemingly least able to provide basic care for their children tend to have the largest families?

While the consistent parallel between high fertility rates and impoverished societies may appear counter intuitive, a number of causal variables commonly exist which rationalize this phenomenon. Indeed, we have just reviewed various situational and observable factors that are widely recognized³ as contributors to the decision-making process behind high fertility rates.⁴ However, it is the position of this research proposal that a gap remains in this decision-making process which has yet to be acknowledged and resolved. This research suggests that the event of having large families or the factors contributing to high fertility rates is not entirely dependent on cognitive elements within the parents' decision-making process.

¹ Lori S. Ashford, Population Bulletin; *New perspectives on Population: Lessons from Cairo*, (Washington, D.C., Population Reference Bureau, Inc. March, 1995)

² UNDP, *Human Development Report*, 1994 (New York: Oxford University Press, 1994)

³ Widely recognized, meaning that the variables to be presented (less the newly proposed variable) are discussed in depth in premier journals and various publications dedicated to family planning issues published by world renowned leaders in this field such as Planned Parenthood Federation and the Population Council. For precise texts, refer to the Annotated bibliography, appendix 2.

⁴ The distinction of what qualifies as *high* fertility rates leaves room for much subjectivity. Thus, for the purpose of this research proposal we will define it as having more than 3 children per woman, which translates into above replacement level fertility rates.

This research will probe deeper into the contributing factors of high fertility rates to better understand the extent that reproductive biological survival instincts (perceived here as the urge to carry on the familial line) contribute to fertility rates. What is the marginal utility of each additional family member? Do couples choose to increase family size when the marginal utility of each new member becomes a negative drain on the group? This puzzle seeks to discover if in fact, those sub-conscious procreative instincts contradict and oppose reasoning factors that would support the reduction of fertility rates under conditions of extreme poverty. It is at this crucial point when an internal drive for numerous offspring (fueled by deeply imbedded survival instincts) defies cognitive or reasonable (given modern circumstances of increasingly limited resources) decisions to limit family size that the eminent survival or well being of the family and sustaining environment is jeopardized.

The social condition is poverty, both a cause and a symptom of the dependent/outcome variable-high fertility rates, leading to human overpopulation, or high population density, increased resource scarcity thus exacerbating the social condition of poverty.

3.2. *Hypothesis*

Hypothesis: *A strong positive correlation will be observed between increased or continued high fertility rates and the presence of harsh living condition because it instills the perception of an insecure existence, (albeit an internal subconscious one) that the survival of the individual or society is threatened. This threat triggers an instinctual population growth drive within individuals, leading to increased fertility rates.*

Contrary to the once revolutionary explanation offered by Thomas Malthus- that population growth continues to rise exponentially to the bounds of available subsistence/resource

base, this researcher proposes that abundant availability of resources ultimately leads to a decline in fertility rates, thus promote population stabilization trends. This sequence is intensified when abundant resources are combined with a peaceful, secure environment and generally harmonious existence.

In observing the strong inverse correlation between high fertility rates and low life expectancies, consider the concept of high risk, adverse living conditions increasing the (subconscious) instinctual drive to procreate the species. Neither anthropological studies nor social science researchers' analysis of survival instincts (triggered by war, disease and famine) increasing fertility rates has been incorporated into this paramount discussion. Thus the survival instinct variable presented here, in which the relationships between poverty and high fertility rates will be further analyzed, has yet to be studied in terms of contributing to increased fertility rates.

My hypothesis is based on the assumption that neither the relevant cognitive factors (pragmatic reasons for childbearing) alone nor a lack of family planning services reconcile the high demand for large families in lesser-developed countries (shown to have higher fertility rates than developed ones). This implies the influence of another factor behind the event of high fertility rates. This newly incorporated variable of "the human instinctual drive to carry on the family line, tribe, and species itself," is the missing (variable) link within the (decision-making) phenomenon of having multiple children under dire living conditions.

To further illustrate the context of this hypothesis, recall Bongaart's Model, "Determinants of Total Fertility Rates". Basically he, the Population Council and most demographers conclude that social/cultural factors -such as marriage, breast-feeding, importance of large families, nuclear family structure or communal, monogamous or polygamous unions, etc.- contribute to proximate determinants, i.e. time in sexual union, spacing between births, # of abortions, etc. equate Total Fertility Rate. This model bears much truth yet fails to recognize the

determinants of cultural and social practices or the concept of economy -critical in this discussion. One must realize the evolution of culture and symbols of economic and social status as well.

Here is the major paradigm shift. The human species has evolved for tens of thousands of years- well before the modern intellectual concepts of culture and society arose, or any pretence of economic prosperity. There was only survival until about the last 5 to 10 thousand years -after the dawn of the agricultural age.

It is true that fertility rates can be linked quite consistently to the economic factors of any given society, thus we must revisit the implications and inherent symbolism of economic hardship, economic health, economic stability and the concept of economic **security**. The hunter-gatherers were non- materialistic and actually limited their population growth with the community in mind in accordance with food availability. Another more recent example of a collectivist society is that of China. Chinese culture, for thousands of years practiced infanticide in accordance with the needs of its immediate social network. In many agricultural and pastoral (herding) societies wealth is measured in number of cattle, as this property ensured the family's eminent survival. These people lived under the law of nature. In agricultural societies where there is an abundance of land, wealth is generally measured in the amount of children one has, as they tended to increase household food security or economic success - the modern equation. These cultural values are structured to ensure survival of the tribe or family line. They depend greatly on prevalent environmental factors.

The fundamental issue being raised is that economic security is truly a modern concept and symbol for our deeply embedded need for security of survival. Economics- in a sense like politics- is the study of who has how much of what and how- while politics focuses more on hierarchical power elements. Consider Darwin's theory of evolution and the "survival of the fittest". It is fascinating to observe modern man's quest for status and power in the western-industrialized

world and consider that competitiveness and seemingly endless power struggles are perhaps remnants of tribal survival instincts, based in the genetic imperative to carry on dominant genes.

To understand the concept of a survival instinct ~ security based factor being a determinant of fertility rates, the link between 'survival and culture' and between 'survival and economy' is essential. This link is the fundamental premise of the "St. James theory" on population growth, particularly from the perspective of modern society.

3.3. *Theoretical inspiration:*

The foundations of the Human Security Theory of Fertility Rates or *survival instinct hypothesis* were initially inspired by my study abroad experience in China during the fall of 1994, which ignited a fervent interest in the dynamics of population growth. Directly after, when traveling alone in the Philippines I observed the reproductive dynamics and trends there. As an advocate of family planning, I discussed the issue of family size with many local people, continually questioning the reasons behind these villagers having six to nine children. One day I hitched a ride on a tiny sailing raft from a fisherman of 26 years named Danillo Dupio who had six children. I'll never forget his words; "I have no money, so I go fish." Interludes as these did not immediately inspire the *survival instinct hypothesis* but have continually increased my understanding of the human element within the population debate and stimulated much thought on the subject.

In more recent interviews with returned Peace Corps volunteers from Chad, Africa we discussed the concept of factors incurring large families being non-cognitive. Their experience asking questions of family size to people they worked with there reflected that the decision of having large families was not a cognitive process or was not a decision at all. In other words their explanations did not stand up to the reasons prescribed by the commonly accepted variables contributing to high fertility rates.

3.4. *Underlying concepts & literature review*

Thomas Malthus, notorious for his "Essay on the principles of Population," attempted to make a science of the "nature and causes of poverty", as Adam Smith had inquired into the "nature and causes of wealth".⁵ His timeless essay was built around the premise that populations intrinsically grow geometrically or exponentially and resources only arithmetically. From this premise Malthus contributed the causes of poverty. He predicted that ***"population does invariably increase where there are means of subsistence...the superior power of population cannot be checked without producing misery or vice."*** When population growth reaches the limit of resources, war, and pestilence and (as he added in later editions) various forms of moral restraints must inevitably redress the imbalance.⁶ His essay was quite revolutionary considering that the world's human population then was a fraction of today's, at six billion. His prediction that population would continue to grow to consume the earth's resources leaving only destitution did not foresee the stabilization of fertility rates in times of peace and prosperity.

In developing societies today where population is increasing, the basic subsistence level is often maintained by modern medicine and imported food supplies. Throughout human evolution violent, disease stricken environments would mark adverse challenges to tribal survival. And today such environments trigger instinctual survival impulses to procreate while external forces or modern advances keep down the death toll and infant mortality while resource scarcity is on the rise.

⁵ Keith Stuart Thompson, 1798: Darwin and Malthus, (American Scientist; Research Triangle Park; May/June 1998)

⁶ Keith Stuart Thompson, 1798: Darwin and Malthus, (American Scientist; Research Triangle Park; May/June 1998)

An ingrained drive for constant procreation was necessary to insure survival of the familial line under the prevalent conditions of plagues, widespread famines, and tribal warfare. In the last century the first exponential rise in global human population has occurred.⁷

Fertility rates have remained consistently high (with a gradual decrease over the last 30 years in newly industrialized countries and post-industrialized societies) while life expectancies have soared due to advances in modern medicine, public health and improved nutrition- for humanity's more fortunate sector. Hence, as the means for subsistence increased so did human population growth. Malthus was temporarily correct. Throughout periods of industrial revolution and modern advancement in some parts of the world human survival instincts and historical cultural norms in others have continued to promote high fertility rates. Ironically, the collective human path of population growth does nothing for our survival and everything to incur eminent ruin as our instinctual and related cultural patterns persist.

Long before the dawn of the Agricultural age, or the advent of Christianity, the heralded message, "be fruitful and multiply; a nation and a compass shall be of thee and kings shall come of thee" (Genesis 35:11) ruled the multitude of clans with strong fraternal interest groups.⁸ These societies that roamed the earth were as diverse in their destinies and traditions as the Ronga warrior tribe and the Rwala nomadic Bedouin herding tribe proved to be. However, all prescribed to God's instructions to Jacob far before the Old Testament was conceived. According to Alois Musil, among the Rwala it is the duty of every man capable of procreation to marry:⁹

⁷ Population, Evolution and Birth Control, ed. G.H. Hardin, (Berkeley, University Press, 1969)

⁸ Karen Ericksen Paige, The Politics of Reproductive Ritual, (University of California Press, 1981), p. 126
The term "fraternal interest group" refers to societies that experience a disproportionate degree of male member power, power which is protected by their fraternal bond and maintenance of the status quo.

⁹ Karen Ericksen Paige, The Politics of Reproductive Ritual, (University of California Press, 1981), p. 127

This duty is laid upon him by his connection with his kinsmen. The more numerous these are, the more power and influence they possess. The individual who refused to defend the rights of his kin would be expelled, and whoever deliberately declined to multiply its defenders would meet the same fate. Without his kin, abl (minimal lineage segment), the Bedouin would be the most wretched of beings.¹⁰

In this culture, women were valued as wealth for their potential reproductive power. The size of a man's herd is tied closely with the number of wives he has not only because camels were required to buy women, but because large polygamous families tend to produce many males who can be used in herding, guarding, raiding, and defense of grazing rights.¹¹ This concept of demonstrating wealth by family numbers has remained a real cognitive variable in the decision-making process of having additional children up through modern times, particularly in many African cultures, although is decreasing due to radical shifts in human resource bases and increased cost benefit per child.

4. *Supporting Evidence and Scientific Foundations*

4.1. *Zoological studies - applied evolutionary biology*

Evolutionary advantage comes from maximizing offspring that survive to reproductive age¹². This concept of evolutionary biology is a key scientific principal supporting the Human Security Based Theory on fertility rates. It was first but an intuitive conviction that threatening

¹⁰ Alois Musil, *The Manners and Customs of the Rwala Bedouins* (New York: American Geographical Society, 1928), p. 135

¹¹ Karen Ericksen Paige, *The Politics of Reproductive Ritual*, (University of California Press, 1981), p. 127

¹² Bongaarts, "Why high birth rates are so low," *Population and Development Review* 1 (1995): 289-296

circumstances would cause humans to biologically or instinctually produce more offspring until two essential evolutionary studies materialized. They both concerned evolution, for interests unrelated to population policy or human fertility. Instead they focused on human anti-aging prospects and general evolutionary patterns. Here we focus on evolutionary biology in other species to increase understanding of the relationship between fertility and environmental factors so that we may identify and better comprehend similar patterns in humans.

Case 1. The Sapelo Island Opossums

The first study of discussion conducted on two opossum populations is outlined by science journalist Fred Warshofsky in his book compiling the most recent groundbreaking studies on aging, *Stealing Time: The New Science of Aging*.

Steven Austad, a professor of zoology at the University of Idaho, has been tracking opossums for many years. His interest was sparked by a mystery that he uncovered when he first began studying these constantly threatened creatures.

"When I would capture one," he explains, "it might be in perfect physical health. It looked fat, it looked sassy. Six months later I would catch the same opossum and it looked horrible. It had fallen apart. It would have cataracts, arthritis, lost weight, it limped. It had just fallen apart in an incredible hurry, and I figured I wouldn't be satisfied until I could understand why."

Austad wondered if the hazardous environment was somehow forcing opossums into a pattern of accelerated aging. "Unlike a turtle," he says, "opossums have a dangerous life their entire life. I think of humans who live under a constant artillery barrage. You have to get your business done in a hurry. That's the only way you get your business done. The way opossums do that is they have their kids in a hurry, and one consequence of that is that they age in a hurry."

For Austad it was a classic example of natural selection having its most powerful effect early in an organism's life. "But as time passes," he explains, "and the organisms passed through more and more and more danger, than natural selection grows weaker because there are going to be fewer individuals alive for whatever happens late in life to leave any babies. Natural selection can create a very healthy young animal but it has no power over an old animal any more than if we had a gene that killed us at the age of one hundred. It would have no impact on our reproduction, so natural selection couldn't favor the gene or disfavor the gene." (Actually I disagree. It seems plausible that natural selection would favor reproduction in the sense that genes of animals with biologically high fertility rates would eventually replace strains of those with lower genetic, biological fertility rates.)

According to Austad, "Life in a hazardous environment therefore means that whether you age or not, you are not going to live very long. That creates favorable conditions for individuals that reproduce in a hurry. Unfortunately one of the side effects of early reproduction seems to be rapid aging."

To embark on the study of opossums he found a place where they had no predators, Sapelo Island. It is one of barrier islands that dot the coastlines of the Carolinas where most, excluding Sapelo, had been hunted dry of opossums- always a southern delicacy.

"The fascinating thing about islands," says Austad, "is that everything changes biologically. And one thing that eventually happens is that the predators disappear. There simply are not big enough prey populations to support them and once the predators disappear, everything changes on the island."

After four thousand years this island population had passed through hundreds of generations with out gene pools mixing with its mainland relatives. It was ideal to conduct this experiment in search of whether these opossums were not only behaving differently, but aging

differently. After tracking the island opossums for two years, Austad made a remarkable discovery. **These opossums live 50 percent longer than their mainland cousins. Even more extraordinary, they produce 50 percent fewer young each year!**

By studying the collagen tissues in the opossums' tails, to find the cause of this physiological aging process he was astonished to learn that the tissues of the island opossums were actually younger. The lack of predators had caused their genes to shift balance from reproduction to self-repair-- transforming every bone, muscle and fiber to make them age more slowly.

Evolutionary historian Jared Diamond, winner of the Pulitzer Prize for his best selling book Germ, Guns and Steel has concluded that the human's gradual ability to defend itself created less pressure to reproduce quickly and more investment in self-repair, promoting longer reproductive spans.¹³

Most significant to the *survival instinct hypothesis*, having lost their fear of predators, the island opossums had also lost the need to churn out babies. The reproductive rate of Sapelo Island opossums was typically four to six pups per litter. Mainland animals usually had litters of six to nine pups. Fewer babies mean less wear and tear on the body.

"There were differences in survival, which you would expect if aging had changed. So reproduction, survival, physiology everything had slowed down," says Austad. "The island opossums live about 25 percent longer on average. The longest-lived one we have found so far is about 50 percent older than the longest-lived one ever reported on the mainland."

Case 2. Guppies - two sides of one waterfall

¹³ Fred Warshofsky, Stealing time: the new science of aging -1st ed. c.1999, T.V. Books, L.L.C. New York, NY

There was another study reported in a University of California Santa Barbara campus wide newspaper producing similar evidence that increased security or reduced threat influences reproductive cycles. It involved a guppy population that changed their genetic makeup in a direct example of survival of the fittest.¹⁴ Ecological genetics professor John A. Endler, and Dr. David A. Reznick began the experiment 12 years ago on the island of Trinidad. There they discovered a tributary of the Aripo river with "barrier waterfalls that fish can't get over" creating "two giant test tubes," explained research associate Heather Bryga of UC Riverside.

Not unlike the case of the opossums, one population living above the waterfall was inundated with the threat of being eaten by Cichlid fish. Rapid maturation and rapid reproduction distinguished these guppies. The second population, living beneath the waterfall, was free from Cichlid; however Killfish threatened the young offspring. Hence after a test population was devised of this second "low predation" population, within two years and 10 generations adapted better size and coloration for longer life and greater mating capacity.

Warshofsky states that, "like the turtle's shell, Sapelo Island has provided the opossums with the protection that has expanded their life spans." And researcher Austad makes a poignant comment on the subject, "Darwin really discovered that there is a great deal of variation within species, and given enough time and the appropriate environment species can change enormously. We are not stuck with a single aging rate. Given the appropriate environment and enough time then aging like height, like weight, like skin color, can change to become faster, to become slower, to become anything that the environment dictates."

Thus should not reproductive cycles be at least as evolutionarily sensitive as any other malleable characteristic? According to the evidence presented here, reproductive cycles do change

¹⁴ Jennifer Adams, "Results of Evolution Studies Can Impact Daily Life," UCSB Daily Nexus

enormously. Furthermore, it seems logical that this function in humans, one of earth's more adaptive and migratory species would be equally subject to environmental influences.

Case 3. Semelparity in male mammals

It is important to recognize also the biological phenomenon affecting certain species governed by genes that spark spectacular flameouts once reproduction -their genetic imperative has been accomplished, limiting each generation to one reproductive cycle or Semelparity. It was recently discovered that Semelparity is not limited to Pacific salmon, certain species of octopi, lampreys, and annual flowering plants.

A student near Brisbane, Australia discovered that a tiny marsupial called the Antechinus also experiences Semelparity within their male population. In fact they all die within days of mating with all receptive females in sight. After conducting autopsies on both the Pacific Salmon and the tiny marsupial, Stanford University's Robert Sapolsky and USC's Caleb Finch discovered that both species meet sudden death when their bodies loose a veritable flood of glucocorticoids (stress hormones). Around the mating period three changes take place that guarantee catastrophe. First, far more glucocorticoids than normal are secreted. Second, the concentration of proteins in circulation that can bind glucocorticoids- in effect is sponging them up and buffering organs from the effects of the hormones- falls sharply, allowing the glucocorticoids unrestrained access to target tissues. Finally, part of the brain that normally curtails glucocorticoid secretion before too much damage is done fails to function. Hence the marsupial mice and the Pacific salmon die from the effect of half the stress related illnesses on earth, packed into a few short weeks." ¹⁵

¹⁵ Fred Warshofsky, Stealing time: the new science of aging -1st ed. c.1999, T.V. Books, L.L.C. New York, NY

By removing the adrenaline glands, the same creatures live on for a year or more thus clearly isolating the cause of early death. This demonstrates how radically, while with less dramatic speed, stress can affect biological processes within very diverse species.

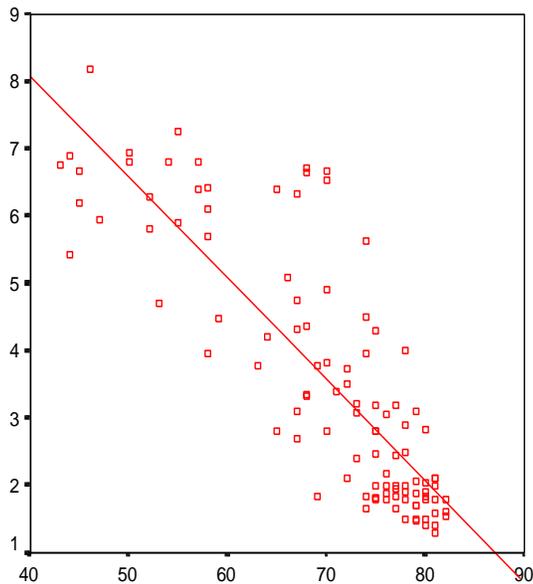
To answer the question, "why must these species face sudden death after one breeding cycle?" Warshofsky rationalizes this phenomenon of Semelparity in the Pacific salmon and the male Antechinus in terms of natural selection. He says, "Since the Pacific salmon have fulfilled their genetic imperative and reproduced, their further presence might pitch them into direct competition with their young for food." Whereas, "the male Antechinus plays no role in child-rearing and, like so many male mammals, are little more than sperm-mobiles racing frantically about in a brief frenzy of mating." He claims that this cycle, even if seeming wasteful of living resources, is "supremely logical given the given the evolutionary imperative to pass on to the next generation the genes that are fittest" - "the ultimate goal of all life."

4.2. *Homo-sapiens Specific Reproductive Implications*

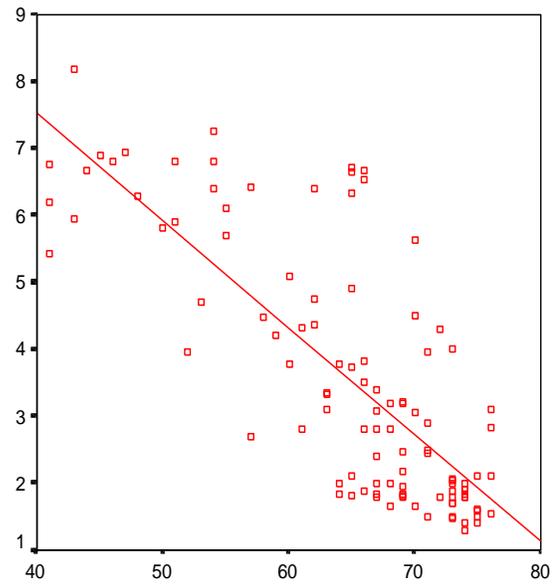
Case 4. Why is life expectancy of women most significant?

Observe the graphs below compare the correlation between female life expectancies and fertility rates with the correlation between male life expectancies and fertility rates. There is a significantly higher correlation between female life expectancy and fertility rates than between male life expectancy and fertility rates of approximately 10 Rsq. points in the same populations. These research findings suggest two things- first that women's conditions being worse than her male counter parts in a given population equate to higher fertility rates, or her life expectancy is of greater relevance than of her partner. And second, that causality between the factors of fertility

and life expectancy work both ways. Perhaps lower life expectancy (and inherently related factors) is not only a cause of higher fertility rates, (the focus of this paper thus far) but that high fertility rates also cause lower life expectancy in women.



Average female life expectancy



Average male life expectancy

This analysis begs the question WHY. What is the evolutionary purpose or reasons behind human reproductive and life cycles? In particular, women's menopause at which point, while otherwise healthy and fit, their reproductive cycle comes to a halt- coupled with a decline in estrogen levels. Some scientists believe it is a simple result of women outliving their predetermined number of eggs, as humans now live longer than they did throughout most of our evolutionary history.

Alternatively, we may suppose this evolved to allow them to serve as grandmothers while not having young children themselves, thus freeing their daughters or younger women in the clan from the lengthy process of child-rearing so their energy could be devoted to reproduction? And perhaps it is due to this biological and social function that women live slightly longer than men do.

While men on the other hand are able to reproduce well into old age (i.e. George Burns) then die when they become too much of a social burden for society for their reproductive value. Perhaps like Lions or any other species facing high competition for reproductive access, their very ability to survive under natural circumstances qualifies their genes to carry on as long as they can survive. Meanwhile women live slightly longer to carry out the child-rearing role rather than a reproductive one.

Case 5. 1200 years of genealogical records- the British aristocracy

To address the relationship between fertility and longevity in women, Warshofsky presents a study of roughly 1200 years of the British aristocracy's genealogical records. It clearly demonstrates that women having children later in life or not at all lived much longer than those bearing children earlier in life. The researchers found a striking correlation between a woman's life span and her age when she gave birth to her first child. Those who died between ages fifty and eighty gave birth to their first child on average at age 24.3. By contrast, women who lived into their eighties had their first child past the age of twenty-five. The ninety-year-olds did not give birth to a first child until an average age of twenty-seven.¹⁶

Some researchers attribute these results to environmental factors or the physical toll exacted by giving birth and raising a family that shortens a woman's life span.¹⁷ An increasingly current view of this finding amongst researchers based more on natural selection is that there is a genetic trade-off between fertility and longevity in women- that these women bearing children are genetically predisposed to longevity and are inherently less fertile. However, recalling the

¹⁶ "Research Links Low Fertility, Long Life in Females," The Associated Press, December 24, 1998.

¹⁷ Fred Warshofsky, Stealing time: the new science of aging -1st ed. c.1999, T.V. Books, L.L.C. New York, NY

"grandmother role" theory, if other factors than age remain constant in these women's lives, perhaps there is some internal mechanism triggered at the time of a woman's first birth. Possibly, while not addressed in this study, a timer is set off for menopause and life's eventual decline in the body's self-reparation thereafter.

Case 6. The Baby Boom - a modern continuance of survival instincts

Consider the post WWII Baby Boom in the United States of America. Indeed, while the men were away at war, birth rates decreased during the war. During this time period thousands of men were lost in fighting abroad. When those surviving the bloodshed in Europe returned however, they and their wives quickly made up for the loss in man-power to the population of the United States. This widespread increase in fertility rates in the US just after the largest world war in history also resulted in the largest Baby Boom the world has ever seen!

A multiplicity of explanations has been given for the Baby Boom phenomenon, such as great joy and happiness in winning the war and great hope for the future. Or that husbands and wives missed each other so much they couldn't wait to indulge in the kind of activity that results in children. However, birth control was widely available and this hope in the future idea is inconclusive when observing the vast amount of information demonstrating that fertility rates are even higher when societies are faced with quite dismal visions of the future.

Hence, it seems quite plausible that the occurrence of a post war baby boom supports the ***St. James Theory/survival instinct hypothesis***. However, further observance of war, population losses and ultimate fertility rate shifts are needed to reinforce this conclusion.

7. The Case of One Country: *Can Senegal escape a Malthusian forecast?*

5.1. *Introduction: Intercultural intervention then & now.*

The story of Senegal presented here is reminiscent of many post-colonial African states. Sub-Saharan Africa is marked by regional border conflicts, civil wars, genocide, deforestation, desertification, hunger and most lethal of all these factors, and the tragic AIDS pandemic. While each African nation suffers a certain degree from each of these unfortunate circumstances, they share much in common historically. After the big scramble of industrializing European powers to claim African territories (triggered by King Leopold's claim to the Belgian Congo, now Zaire in 1879) various spheres of influence were carved along with various raw materials. These claims were formalized at the Berlin Conference of 1884-85 to which the African people were not invited.

Now just over a century later many resources continue to be exploited for the likes of more technologically advanced societies, not slaves destined for faraway plantations bought through victorious tribal leaders, but billions of dollars worth of oil, diamonds, etc. The income generated by such exports generally escapes the grasp of desperate local inhabitants and is siphoned into foreign holding companies and bank accounts of corrupt leaders often supported by a democracy preaching U.S. government. The lengthy survival of corrupt Mobutu Sese Seko's now fallen regime is but one example.¹⁸ (Gratefully, there appears a recent transition toward real democracy recently in South Africa, from this year's election in Senegal, and shortly in Zimbabwe and Kenya. Kingly status of first national leaders after independence seems to be fading making room for greatly needed political and governmental transparency and accountability.)

¹⁸ It was estimated by former Prime Minister Nguza-Karl-Nond that by 1982 Mobutu had approximately US \$5 billion in Swiss, Belgian, and French bank accounts. "Odious debt: Western Enablers and African Addicts", Amanda Morgan c.1999

The international creditor community's relationship with Senegalese Prime Minister Abdou Diouf appears suspect as well. Boasted by US as being one of the only true multi-party democracies in Africa, somehow Senegal's original *Parti Socialiste*, in power since 1968 hasn't lost an election yet. Furthermore, since its birth at independence has seen the likes of only two presidents, the first, Leopold Senghor and his hand picked successor, Diouf almost 20 years later.

Dakar local Ebu said of President Diouf, "He is the man that everybody despises. Come time for election and maybe you see a little cleaning up, or something for the people". The actual level of legitimacy of the current regime is difficult to assess. However the fact that corrupt means for retaining such power is clear and should be a primary consideration while looking at a GDP growth averaging 2.5% a year compared to a population growth of 2.9% and a food self-sufficiency of about 50%¹⁹.

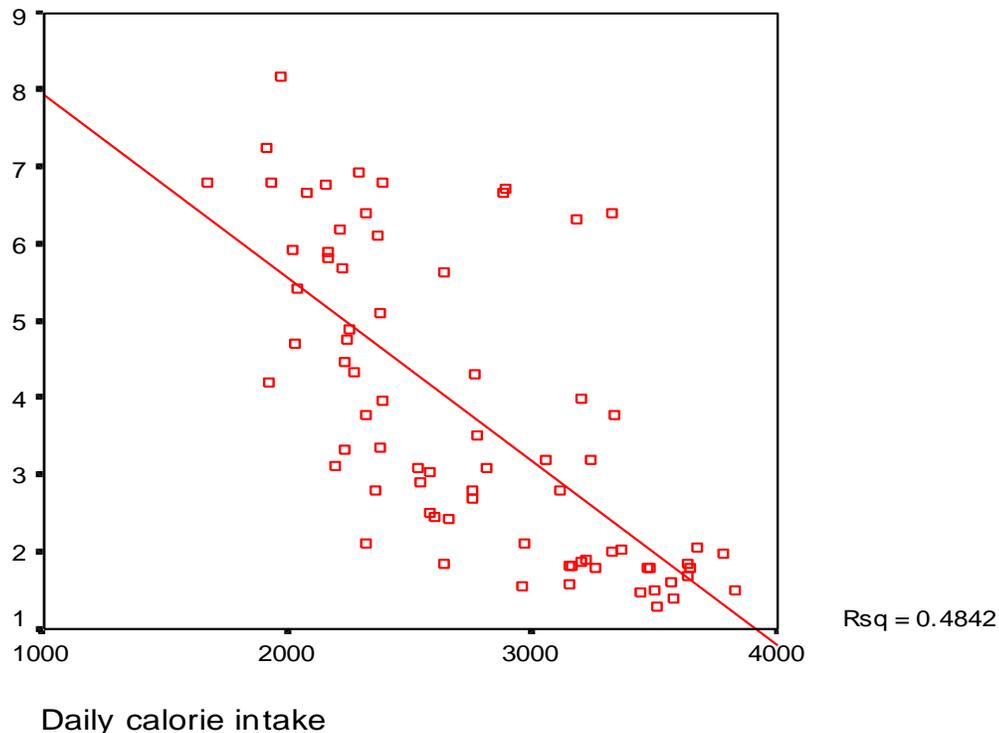
5. 2. *The bottom line: Poverty and a diminishing resource base*

Although the majority of Senegalese people work in agriculture, less than 75% of the people's caloric needs were met in 1995, a 10% decrease from 1970's figures of meeting 84.41%.²⁰ This can be attributed to the fact that 40% of arable land is used for the production of ground nuts (peanuts), Senegal's largest export and cash crop employing one million people, over 10% of the Senegalese population. This exacerbates the food security challenge, as people encouraged to grow cash crops are invariably unable to grow food for household consumption. Long-term food security is threatened further as these large plantations have devastating effects on the environment and the land's holding capacity. The plant itself strips nutrients from the soil, the

¹⁹ Country Strategy Outlines: Senegal, World Food Programme, March, 1997

²⁰ UNDP Human Development Report -1995 Country Indicators

leaves and brush it sheds are collected for animal feed instead of replenishing the soil, and when harvested the entire plant is ripped out roots and all- leaving loose, dry soil exposed. This leaves soil open to erosion mainly from wind as well as from rain and grazing animals. It is a wonder such unsustainable agricultural practices would persist when Senegal's greatest threat is famine.



The roots of this tragic miss-allocation of land are twice embedded into the status quo of Senegalese life. The first reason for so much land being used for peanut production is the widespread economic dependence on this cash crop. While yielding diminishing marginal returns it equals 20% of total export earnings. France being the number one customer, Senegal is following a post-colonial trade cycle. Furthermore, this system is steeped in a political alliance

between the current government, the *Parti Socialiste* and the *Mouridiya brotherhood*²¹ which is the largest Muslim brotherhood in Senegal with over two million *Mourides* (followers). The governing party continues to give the brotherhood concessions of power, land and profits in the ground nuts industry for their political support, thus insuring they win each election. This mutually supportive relationship cuts even deeper into a desperate situation where people are literally going hungry and land resources are scarce and deteriorating.

Women and children are the most adversely affected by this allocation of Senegal's land resources. Infant mortality is at 131/ 1000 births, and their primary care givers – women make about two thirds of the population defined as poor. Despite their major role in food production, rural women have limited access to agricultural credit because of their structural disadvantage to meet the strict conditions imposed by the Agricultural Credit Bank (CNCAS).²² With a literacy rate of only 23% women have little opportunity for upward mobility and often find themselves trapped in desperate cycles of poverty, in which high fertility rates are inherent.

5. 3. *Dynamics of growing demands*

Where rapid population growth is concerned Senegal's demographic trends resemble those of post-colonial societies throughout the world. Its population growth rate of 2.9% is certainly among the highest. Before colonial intervention these late industrial bloomers in the Southern Hemisphere had sustained relatively low population growth rates as traditionally high fertility rates were met with high death rates due to lack of modern medicine and sanitary

²¹ Islamic brotherhoods are groups (some dating back hundreds of years) of men who follow the teachings of a particular Muslim teacher of the Koran who they believe to be closer to god than the average man. These brotherhoods form a central core of Senegalese modern society and an integral part of the economic and political status quo.

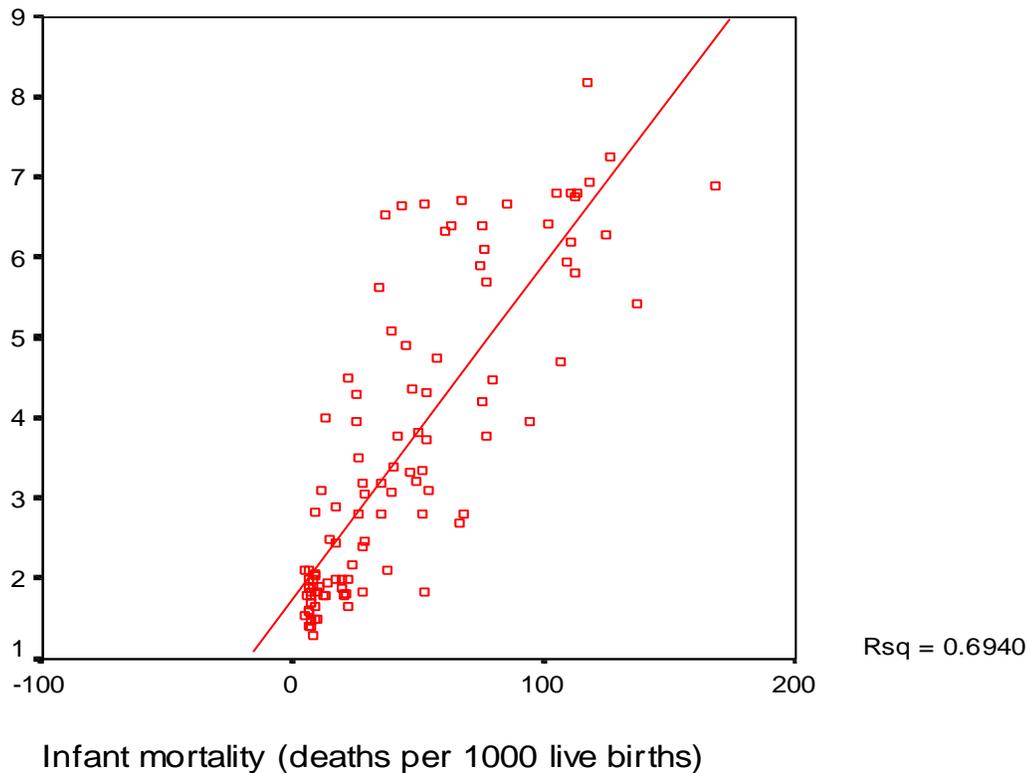
²² Country Strategy Outlines: Senegal, World Food Programme, March, 1997

practices. Then Penicillin and vaccines came to treat deadly diseases like Tuberculosis. With the infusion of modern medicine, new religious dogma and social customs, traditional checks on fertility rates declined and an increase in child bearing years of women through increased life expectancy led to the initial increase of fertility rates for a significant time period before family planning programs were introduced. This sequence of events greatly increased population growth rates by contributing to both a reduction in mortality rates and increasing fertility rates.

Two examples of Senegalese customs that historically regulated fertility rates are birth spacing through extended breast-feeding (post-partum amenorrhea) and the practice of polygamous marriages. The practice of extended breast-feeding acts as a natural form of birth control by hormonally reducing fertility in women during the post-partum period. Sexual abstinence also occurs during this period, particularly in polygamous marriages. Extended breast-feeding will generally space pregnancies at approximately 2 and a half years between children. Moreover birth spacing improves the general health of mothers giving their bodies time for vital nutritional refortification between pregnancies. Over half of pregnant women in Senegal today- 53% are estimated to be anemic or undernourished. With improved health of mothers come increased child survival rates that lead to lowered fertility rates and create an upward spiral toward meeting the greater goal of an improving the human condition. As parents' security increases that their children will survive to reach adulthood, they tend to have smaller families, more confident of having the desired end amount of offspring.

The bi-variate correlation below demonstrates a clear positive relationship between fertility rates and infant mortality rates. Statistical output data of R squared signifies that by knowing infant mortality rates, fertility can be predicted with 69% accuracy (considered extraordinarily high by most statisticians). This can be explained by Evolutionary Advantage - as

families maintain a target child survival rate, when they cannot be sure of infant survival, they will have more young to increase their chances of meeting their surviving child quota.



Senegalese peoples had practiced Polygamy (a man takes more than one wife) long before the introduction of Islam. Writings in the Islamic sacred text, the Koran, states that men are only to wed up to four women *and* they must treat each wife equally. Contrary to common western perspective, there was an actual reduction in the existence of polygamy via the spread of Islam in Senegal. The moderate, secular government of Tunisia, representing a vastly Muslim population has outlawed the practice of Polygamy because it concluded that no man could possibly treat their wives equally. With the continued exposure of modern western culture in Senegal polygamous

marriages continue to decline. There is a lack of scientific consensus whether lowered fertility rates result from polygamous marriages.²³ Evidence is somewhat inconclusive for traditional societies, where polygamy is prevalent; they are often simultaneously agriculturally based where large households are highly regarded for social-economic purposes.

However, a lower fertility rate per woman may occur in polygamous households for several reasons including, 1. A lesser degree of conception on average - Several wives may mean less frequent intercourse with any one. 2. In labor intensive environments (rural farms) where co-wives co-operate to rationalize childcare and other tasks, women in polygamous families have less need for children's assistance thus decreased cognitive motivation for high fertility. 3. In Senegal second or third wives taken tend to be much younger than their husbands, thus male sub-fecundity results in lower fertility rates. 4. On the supply side, within a given household feeding capacity is more quickly reached in the given economic possibility frontier of one household with limited land holdings and so many women to feed. From the labor demand perspective as well, the maximum marginal utility per child is more quickly reached in regard to the land that requires tending.

The nature of population growth in sub-Saharan West Africa reflects a combination of tribal customs and modern influences yielding the highest fertility and population growth rates on earth. Senegal today is no exception with an annual population growth rate of 2.9% its population of approximately 9 million is expected to double in the next 25 years. This equates to exponential demands on Senegal's limited agricultural production capacity, overtaxed natural resource base and economic pressures with unemployment rates upwards of fifty percent.

²³ Ingrid Palmer, Gender and Population in the Adjustment of African Economies, p.63 c.1991 International Labour Office, Geneva

5. 4. *Human Security View -Influencing factors of high fertility rates in Senegal:*

According to the Human Security View, the human survival instinct²⁴ urges parents to carry on the family lineage when circumstances are less than favorable. Evolutionary Advantage (maximizing offspring that survive to reproductive age) explains the positive correlation between infant mortality and fertility rates.

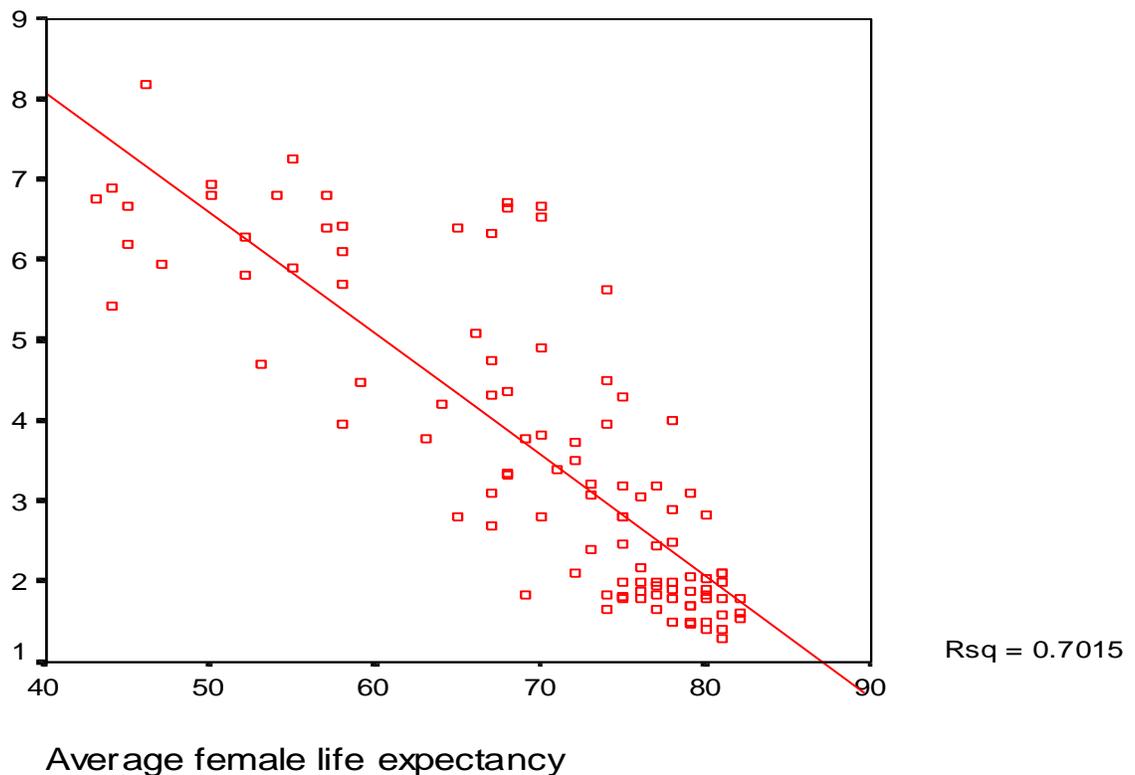


For practical reasons, high reproduction rates play an integral role insuring plentiful hands avail to augment labor in poor rural settings where 80% of the population works in agriculture.

²⁴ The survival instinct factor for reproductive decision making is based on the theory that people are driven by an instinctual urge to procreate their species. If conditions of poverty are severe enough that instinctual sensors detect a threat of being wiped out by famine, war, or disease, they will increase procreate to increase the odds of their species' survival.

With an infant mortality rate of 94 per 1000 live births, and approximately 13% of children not reaching their 5th birthday, large families are a small form of social security for the rural poor. This betting on numbers in turn only diminishes the odds of success for individual children thus deepening the cycles of poverty for such households. Thus both from a situational/cultural perspective as well as a biological/evolutionary this high inverse correlation clearly states, “The lower life expectancy is, the higher the fertility rates will be.”

High Senegalese fertility rates are thus quite predictable, particularly when one considers the average life expectancy at birth is only 49.3 years.



Culturally speaking, particularly in rural settings where modern lifestyles with their inherent pushes toward reduced family size, an increased challenge to achieving a population balance rests in the deep-rooted traditions of the Senegalese. For example, it is common custom that

5. 5. *Not so simple solutions*

Religious factors are commonly pointed to as a natural barrier or a cultural argument against the introduction of family planning programs throughout the world.

The strong inverse correlation shown here between female literacy and fertility rates is consistent throughout the world despite what the predominant religion may lead some to believe. The two countries with the **lowest fertility** rates shown on this plot are Spain and Italy, predominately **Catholic**. The country with the highest fertility rates, Rwanda, also happens to be predominantly Catholic. **Religion is not a statistically significant factor** in determining the number of children per woman. Knowing either the female literacy rate or life expectancy alone on the contrary allows us to predict fertility rates with an accuracy rate of 70% (statistical R sq. = 0.70+).

The indicator of Female Literacy can not be isolated as a causal factor as it also suggests a multitude of simultaneously prevalent cultural and situational factors that may influence fertility rates. A major reason that female literacy rates serve as such a determinant of fertility rates is the inherent empowerment value of education and increased security of survival that comes with it.

Also where high female literacy is commonplace, the cost of raising children far outweighs the financial benefit of their labor outputs. In such societies the cost of education is but one contributor to this cost reversal. Economies that reward educated and skilled workforces naturally promote reduced family size. At this point parents tend to have children according to their social-economic preferences and with greater consideration for future success of the children themselves.

The living conditions and general family economy in Senegal are quite far from reaching this point of natural transition towards a lowered target family size. In face of this challenge, the government has put family planning at the top of its agenda.

In accepting the strategy of educating girls for reducing fertility rates among its education goals (alleged) budget allocations of over 33% are aimed at increasing a miniscule literacy rate of 33% and 23% for women. They have a long way to go to improve their inadequate education system where children attend in partial shifts and teachers go for months unpaid. At present the education system is as poor as the children who cannot afford to attend school are.

While these needs are still unmet, the Senegalese people are quite receptive to family planning services. While extremely low by western standards, the Senegalese contraceptive prevalence rate of 5.8% reached in 1996 was actually ahead of targeted reductions according to the USAID Congressional Presentation '98: Senegal. Amongst the discussion of religious opposition and importance of cultural sensitivity surrounding population topics, collaborated studies from USAID cite that Senegalese women from all strata want to control their fertility: 66% of women and 44% of men approve of family planning.²⁶ This demonstrates a profoundly unmet demand for a very high leverage health service.

5. 6. How close to hope?

Senegal is certainly dependent on foreign aid to overcome its subsistence challenge. Just to feed its rapidly growing population, it sinks deeper into debt. Currently the burden of repaying loans to the western banks thwarts Senegal's economic productive potential or the government's capacity to provide for basic health requirements. The International Monetary Fund introduced 'structural reforms' and austerity plans, imposing a major devaluation of their currency in '94. This greatly eroded living conditions for the ordinary Senegalese: (Per capita GDP dropped from US

²⁶ "Family planning services" refers to basic reproductive services and education for women and men, including prenatal and infant health services and child survival activities which significantly reduce infant mortality and AIDS prevention. The objective of "family planning services" is to provide women and men with reproductive health rights to make the best choice possible for themselves and their families.

\$740 in 1993 to US \$471 in 1994)²⁷ their wages went down; food prices went up; and services such as schools and hospitals were cut.

While Senegal's potential for salvation is hindered by a set of precarious obstacles it is blessed with a relatively peaceful, religiously moderate and culturally diverse society, a steadily growing tourism industry, a *stable* (while corrupt) government with great potential for improvement. Peace and stability do count for a lot these days. In this regard Senegal is well ahead of many countries in Africa and the world. Perhaps her salvation could come with debt relief.

The level of generosity required to write off the entire sub-Saharan African debt to western banks of US \$16 billion equals the cost of a fleet of jet fighters. If we were to concentrate only on education (also reducing fertility rates) US \$ 6 billion required to provide adequate education to all children in all developing countries is just 1% of what the world spends every year on military budgets. The United Nations calculates that it would cost roughly US \$80 billion to provide universal access to basic social services, and to alleviate income poverty in all developing countries- this figure is less than the combined net worth of the world's seven richest men.²⁸

To answer the question then, "Can Senegal escape a Malthusian forecast?" It appears this country is far more endowed with hope than was Rwanda before its bloody massacre. However if population growth rates continue to rise, and land distribution policy responds to elitist needs for short-term political survival, the people of Senegal face a tragic predicament. At this point in time, proactive measures to prevent such a fate, in Senegal and throughout much of sub-Saharan Africa will require a wise awakening of conscience within the global elite.

²⁷ Country Strategy Outlines: Senegal, World Food Programme, March, 1997

²⁸ David Else, The Gambia and Senegal, c. 1999 Lonely Planet Publications

8. Original field research in the region of Casamance, Senegal- Summer 1999

6.1. General Indicators of Target Population:

Casamançais: (inc. Jola and other ethnic groups) in Senegal

Population: 870,000 10.4% of Senegal's population of 8.5 million (population estimates based on 1999 USAID Congressional Report 1998)

Population growth rate (Senegal): 2.7% or doubling every 25 years.

GDP per Capita: US\$561 in 1995 and stagnating.

Average Life Expectancy: Approximately 49 years.

Illiteracy rate: 61.7% in 1990

Maternal Mortality: High at 510 per 100,000 live births.

Child Mortality: Relatively high at 131 per 1000 live births.

Ethnic Groups: Jola, Mandinka, Soninke, Serer, Wolof, Fulbe, Toucouleur, and Bambara

Religions: The majority of the population is Muslim while Diolas are mainly Christians or animists. However proclaimed Muslim and Christian peoples live in a world steeped in animist tradition. All religions incorporate the mystical remnants of their animist heritage regardless of any modern spiritual conversions.

8.1. *Regional juxtaposition - geographic & cultural politics*

The geographic juxtaposition of the Lower Casamance is directly related to its political and economic struggle. This bottom slice of Senegal is separated from the rest of the country twice; first by the nation of Gambia running narrowly east from the Atlantic Ocean thus cutting most of Senegal from the region of Casamance. Hence the Ziguinchor River further isolates the southernmost, Lower Casamance from the rest of the region. It is here near the border of Guinea-Bissau where civil war waged between minority Jola separatist movement and government forces plague the local economy, which depends heavily on tourism for survival.

Separatist sentiments among the Casamance people have existed since colonial times, during which the Jolas resisted French influence. Traditionally, the people of the Casamance have remained aloof from other parts of Senegal. The geographical and political separation by the Gambia River and the British colony of Gambia helped them maintain their own language and culture but also hampered the region from being incorporated into the rest of Senegal. While over 80 percent of the country's population are Muslim, Jolas and other Casamançais have retained their Christian or indigenous beliefs. Even after Senegal's independence in 1960, the resistance of the Casamançais continued. Like many other post-colonial Third World countries, the state, through its centrality and its extended role in the economic sphere, often repeated the practices of colonial rulers. Such "internal colonialism" resulted in excessive socioeconomic inequalities among ethnic groups and, as a result, disadvantaged peoples perceive that their region is dominated and economically exploited by the internal colonizer, that is, their government. In the wake of Portuguese and French colonial control, Jola and other indigenous people in the Casamance mobilized and resisted exploitation of their fertile rain forest land by the northern Senegalese government.

8.2. *Regional economic and agricultural prospects*

The Casamance was traditionally favored with up to 3 times the rainfall of northern Senegal. However local indicators site that rainfall has decreased by half over the last 30 years as a result of with regional deforestation. Coupled with **salinization** of delta regions and over-farming spell overall soil depletion and reduced agricultural output. While the northern part (north of Gambia) is a vast Savannah zone, which is prone to desertification, the Casamance enjoys forested and fertile land suitable for agriculture. The region produces most of the country's food yields

(including half of the country's rice, cotton, and corn) both for domestic use and for export. The broad and beautiful beaches in the Casamance draw in much of the country's tourist revenue. Nevertheless, most of the region's agricultural and tourist earnings are directed to Dakar, the country's capital.

This lower Casamance region is where I traveled and stayed with the family of a local friend, and where most interviews were conducted. As were a few interviews conducted while traveling alone by bus and ferry back to Dakar.

8.3. 40 Interviews "What are your main reasons for having children?" 1st to 4th

In a search of the missing link of motivating factors of childbirth, I was struck with the idea to simply ask people what motivates them to have kids! One can analyze indicators and outcomes in the lab in any university campus, but to get qualifying explanatory information what better source than the very people we wish to understand. In discussions with the men and women of my host family and their friends and neighbors we concluded that there were four key motivating factors for having children which I quickly put into a survey format. They include- 1. "Social Security" (having children to insure you are cared for in old age). 2. "The joy of children" (love of parenthood). 3. "Work assistance" (the production value, or childhood contribution to household). 4. "The grandeur of the family", also stated as family advancement and if this was not clear enough I borrowed this metaphor from my Jola interpreter and friend, "We are the trees, when the old tree dies, the seedlings come and replace us."

6.4.1 Methodology

In total, the researcher conducted forty interviews making a survey sample size, N of 40. Methodology: The four presumed factors motivating fertility rates or "reasons to have children", as presented to the interviewees, were written out on a blank piece of paper in a circular fashion to prohibit any particular sense of order. They were then described in a different order each time to insure order of presentation did not affect choice. There appeared to be no correlation or concern for interviewer's order of presentation.

Upon introduction, the interviewer introduced herself, and explained that she was doing a social studies project for school, said that their time is very much appreciated and valued, and then asked if the people would like to participate in this research and answer a few short questions. They were always willing to participate and often felt quite pleased or flattered by the interest. Most of the interviews were conducted in the far south, Lower Casamance region, where most people are not fluent in French so the interviews or questions were asked in their vernacular language. Two interpreters assisted head researcher in communication throughout the interviewing process. The first interpreter by the name of Oliver Diatta assisted in conducting interviews in his vernacular language Jola in the Jola village of Cabrousse and the surrounding area in Cap Skirring, Lower Casamance. The second interpreter, Inssa N'diaye assisted in communication and asked questions in his vernacular languages, Mandinka and Wolof, within and around the Casamance regional capital of Ziguinchor. The researcher had spent hours discussing the survey questions and rooted meaning with the interpreters and was confident that the interpreters understood the questions more than sufficiently to communicate and answers accurately for the purpose of this investigation. In fact when the Jola interviewer felt the initial factor labeled advancement of family or grandeur of family was not received well by one participant, he created a metaphor of small trees replacing the big trees to this Jola elder in such a culturally appropriate context. The Jola people are one of the few Animist tribes remaining in

sub-Saharan West Africa. Being Animist means that their spiritual or religious devotion resides with nature and entities within the forest. Much of this minority group has not yet subscribed to the Judeo-Christian faiths that have dominated most of Africa including 90+ % of Senegal, which is predominately Sufi or Muslim-spiritualist. However many Jola have adopted a hybrid faith, accepting Christian and Muslim beliefs in addition to their traditional nature-based beliefs.

After each of the four possible factors were clearly presented to the interviewees, they were asked to identify the one that most applied to them, then choose the second third and finally the fourth. They were handed the pen to mark their personal reasons for having children. Most subjects were quick to identify their choices once they understood the question.

Once the selection had been made, the interviewer recorded the subjects' name, age, sex, marital status, years of formal and informal education, number of children living and deceased and what their target number of children is within their lifetime. The first twenty-five subjects were asked, "Have I forgotten something- another fifth reason for having children besides those listed here, could they think of one more?" All 25 of them confirmed that these four reasons covered all the bases and while all were asked, none suggested a fifth that may have been missed.

6.4.2 *Interview results - data summary*

A simple, qualitative summary of the data has been made to demonstrate the interview results. Head researcher has quantified the results of the forty survey respondents by allocating points to each of the four possible reasons for having children as each respondent has done in the interview process by listing reasons one through four. Hence for each interview a number is allocated to each of the four reasons, these are then calculated separately. The reason/factor with the least points will have been selected most as first and second choice from respondents. In this

survey "Social Security" received a total of seventy-nine points being the lowest number, and most strongly accepted/ identified with factor. The second most chosen was the "Work Assistance" factor, with ninety-four points. This was followed by the "Pleasure or joy of having children" factor totaling one hundred and six points. Very closely behind this was the "Grandeur of the Family" factor with one hundred and eleven points.

"Grandeur of the Family" is a very significant factor to study here as it was specifically meant to target the missing link of human instinctual procreative drive. While coming in last among the other three reasons for having children it was very close in following these widely recognized reasons for having children. Nearing the end of the interview cycle, the head researcher began asking people to explain in greater length what this "grandeur of the family" meant to them. It was necessary to gain greater understanding of this factor signified as so much emphasis was being put on it for this study. One man in his mid-twenties with some college education behind him stated that the most important thing for an African man is his status and respect from the community he lives in. This was gained by having a good, large family who did well for the community.

The researcher would have ideally run this survey across the region, across a wider cross-section of tribes and socioeconomic groups. Although in observing these subjects' descriptions, there appears a wide variety of the population are represented in terms of their age, tribe, education or religious background. Indeed the small sample size of this survey would leave considerable room for error if this data were to be calculated statistically. However at face value it represents the positions of the interviewees themselves which clearly concludes that the factor of 'carrying on the family line' rivals those of 'the joy of children', 'social security' and 'work assistance' in contributing to the decision of childbearing.

Of all the interviews conducted in the lower Casamance, the most telling of this region's reality was with the eldest woman in the Jola village of Cabrousse near the border of Guinea-Bissau. In her native tongue she wished me much luck in my work and affirmed that these were good questions. The exact number of her years was unknown, only that she was the eldest. My local Jola friend estimated by the age of her children that she was about 70 years old. Only three of the six children she gave birth to survived to adulthood, a common child survival ratio for her generation in this area. Previously the same day I'd interviewed an elder man in the same village and four of his eight children had survived. In the same sitting I met her grown son who described the rapid reduction of arable land due to salinization of soils from rising salt water on the delta, soil infertility due to over-farming, and a continued reduction in rainfall- half the annual rainfall of 30 years past. To meet growing demands for fertile soil, marginal lands are cleared of native trees exacerbating the situation by ultimately further reducing rainfall.

7. Theoretical conclusions - *Malthus was shortsighted!*

If nothing else, it is the author's sincerest hope in writing this paper that readers realize without a doubt that feeding people does not increase fertility rates or contribute to population growth- poverty does! For the survival instinct hypothesis to be proven, and thus conclude the how and scientific why, further testing is required. However, regardless of why it occurs it is quite evident just **what** is occurring. By observing the proximate and social-economic determinates of fertility rates we know that poverty itself is highly correlated with high fertility rates.

Hence Malthus was indeed shortsighted in his attempt to make a science of the "nature and causes of poverty" in his notorious "Essay on the principles of Population".

His conclusions clearly reflect the pre-modern age of the fertility transition that he lived in. Two hundred years ago Western European fertility rates rivaled those of sub-Saharan Africa today. Holland was the only country at that time demonstrating any semblance of the fertility transition that would occur during and beyond the Industrial Revolution.

In the modern post-industrialized world the Law of Nature has been replaced with the Law of man. And this shift seems to be a one-way transition once the social fabric has replaced its dependence on nature and tribal survival to dependence on a greater legal and social structure consolidated by the evolution of the nation state. Separately, one must consider the influences of socialism on the fertility model presented here ~ recall the social security and welfare concern as a determining factor of fertility rates discussed in the field study of Casamance and relating to this entire theory. Populations in Cuba, and Russia become out-layers contrary to the predictions of most fertility models based on social-economic factors. Cuba, with pre-industrial, agriculturally based infrastructure is an economic catastrophe at present, rationing rice to its citizens, yet has a fertility rate of about 2.4 children per family. And Russia's life expectancy is extremely low while bearing negative population growth! These out-layers may be explained with the theory that socialism increases the human security base and that once this is felt- law of nature being replaced with the man of law -there is no turning back. The transition to modernity, and thus the fertility transition is one way- as our survival instincts diminish. Further, consider China. Is the rapid birth control campaign more viable here than it would be in non-socialist countries?

It is easily observed that environmental factors can be over-ridden by educational, family planning programming as in the case of Zimbabwe where fertility rates have dropped dramatically in the last decade as a result of ambitious educational family-planning programs.

The United States has bypassed the Malthusian nightmare (solved the subsistence challenge) due to an abundant wealth of natural resources and the military strength to ensure

comparative advantage in access to world resources. Where does this leave populations of emerging economies? Most of their people are under the age of 25, and their numbers increasing rapidly. What opportunity or advantage are they left with in a world where all arable land has been staked and cornered off by giant multi-national firms like Nestle and Phillip Morris who thrive on these fast growing, uneducated masses of emerging economies? How many generations (or doubling of its population) will it take for the natural development cycle to stabilize its population growth? Clearly the more rapid population growth is in a labor-surplus economy, the more difficult it will be to improve living conditions.²⁹

Judging by the consistent decline in birthrates throughout various parts of the world, Malthus was clearly shortsighted particularly where post-industrialized countries are concerned. Peace, stability and new economic and social realities have refuted his prediction that human population will expand to the meet the bounds of subsistence. They no longer feel that their survival is threatened. Civilizations like the United States (one of many examples) are testaments to the levels humans can reach well beyond mere social subsistence. The average US citizen thrives so much to be able to consume the energy of 3 Japanese, 6 Mexicans, 15 Chinese or 50 Senegalese. One could say that in the United States, while human population might not grow to meet the bounds of subsistence, the US consumption levels make up for this in devouring all resources until we meet the edge of subsistence as to ensure fulfillment of this dooms day prophecy.

In bitter contrast, the bloodshed that transpired in Rwanda follows Malthusian predictions perfectly. Here the population has existed at a level of development more visible in Malthus' day. With one of the highest fertility rates and lowest life expectancy rates in the world, the Rwandan people's ability to meet their subsistence needs diminished rapidly leading to the slaughter of its highest land consuming Tutsi (cattle raising) minority group.

²⁹ Taking Action to Reduce Poverty in Sub-Saharan Africa, c.1997 World Bank Publications

Human evolution has not yet caught up with the rapidly advancing technological advances that have both propelled industrialization, and made both our trends of development and consumption unsustainable. Therefore, the search continues to both discover and develop more creative and pragmatic solutions to this global challenge.

8. *Recommendations and Implications for Global population policy "broadened responsibility & hope"*

In proposing security as a determining factor of fertility rates, the author suggests that there are other means of reaching global population stabilization besides universal modernization and industrialization. A diminished need for children can be fostered alternately through improved governance, social security systems, new education paradigms and through a reduced threat to human security- also including environmental security measures.

A human security approach to population policy invites a multitude of organizations and governmental agencies that have in the past neglected this issue- to address it now. It demands attention from international and domestic policy makers across the board and that the international community expands responsibility for global population from the relatively miniscule demographic sector. It is time that the human demographic reality becomes every agency's concern. It is time that International Population Policy becomes International Human Rights Policy, International Security Policy, International Environmental Policy and International Economic Policy.

8.1. *The ICPD framework*

To compare the current, past and proposed approaches calls for a brief review of the global policy set fourth at the 1994 International Conference on Population and Development in Cairo which the major family planning organizations contributed to the development of and follow the objectives of today. The resultant document, "The Program of Action" was notably progressive in contrast to prior approaches to population policy adopted by the international community. It proposed a new paradigm for population policy that puts women's concerns first as opposed to former top down models that treated women and children as numbers, and were focused on quotas of fertility reductions- numbers of women receiving birth control methods. Sadly, these commonly applied past approaches invariably disregarded human dignity and in some cases have led to grave abuses of human rights where birth control methods were forced upon women or accepted without receiving essential information.

Key objectives embraced by modern family planning organizations include insuring quality service and choice to their clients. Good service and choice not only preserves the dignity of the recipients but has proven invaluable to insure continued family planning receptivity.

It was estimated at the ICPD Plus Five conference held in The Hague last year that over nine billion dollars is needed to meet family planning objectives targeted at stabilizing global human population in the next twenty years. The majority of these funds are required to provide clients with quality family planning services and adequate choice of birth control methods - critical to acceptance and continued use of family planning and this element is critical to any population policy.

At the 1994 Conference and Population and Development in Cairo it was concluded through a growing body of scientific evidence that improvements in women's status is good

development policy and may well be the key to lowered birth rates.³⁰ Empowerment initiatives drawn here will be thoroughly supported by the results of a proven hypothesis in this research. It is empirical fact that empowerment initiatives serve to lower fertility rates, particularly in developing countries where fertility rates are highest. Both the underlying assumptions of this theory and the conclusions made in the research of it thus far support the social empowerment of women as a pro-active measure in lowering fertility rates in addition to providing top quality family planning health services and education.

8.2. International Debt Relief & Human Security

Recall the key economic principle of the Human Security View on the determinants of fertility:

"Economic factors represent levels of human security ~ the greater economic security one has the more they feel generally secure ~ economic security = confidence in survival = reduced fertility rates"

Each day, the rich West gets \$35 million in debt repayments from the poorest nations in Africa, countries that don't have enough money to spend on education and health care. The debt burden of 20 of the world's poorest countries could be lifted for the cost of one Stealth bomber.³¹

Between 1983 and 1990, indebted developing countries repaid (U.S.) \$1 trillion. However, their debt burden increased from \$800 billion in 1983 to \$1.5 trillion in 1990 and nearly \$2 trillion in 1997 because of debt service arrears payments and new borrowing.³²

UNICEF and Oxfam estimate that achieving good-quality universal primary education in sub-Saharan Africa would cost (U.S.) \$2 -- \$3.6 billion a year for 10 years, an amount equivalent to

³⁰ Lori S. Ashford, Population Bulletin: New perspectives on Population: Lessons from Cairo, (Washington, D.C., (Population Reference Bureau, Inc. March, 1995)

³¹ Netaid.org.'s official website of CISCO systems.

³² UNICEF, Progress of Nations, 1999

one-sixth to one-third of current debt servicing.³³ Even under the proposed G-7 debt initiative Mali will continue to spend more on debt servicing than on primary health care and basic education combined.³⁴

According to the Human security view on fertility rates threatening both human and environmental security and promotes population growth in these countries. That such Heavily Indebted Poor Countries are being forced to forego their own population's most basic needs presents a severe conflict of US national interest -whereas the resultant poverty exacerbates the global population crisis that the US seeks to ameliorate. Institutions such as the International Monetary Fund and the World Bank must be actively engaged in this process as their current US dominated policies bear the most leverage over the fate of and bear the most power to improve the economic and general insecurity of the world's poorest populations.

The international refugee situation serves as a striking indicator of the state of international security. Today there are twenty two million international refugees that have fled their countries of origin. However another 30 million people have been displaced within their own countries. Of the 30 armed struggles in 1995, none was a war between nations. All were related to civil strife, separatist movements, or ethnic violence. Women and children, as always, pay the heaviest price and usually represent more than 75 percent of a refugee population. And more often than not, the poorest countries have to bear the burden of refugees from elsewhere. At the end of 1994, 23 poor countries hosted at least 50,000 refugees each.³⁵

The causes of acute conflict are deeply rooted to extreme poverty, environmental degradation, and or scarcity of natural resources. There is clearly set of cohesive pestilence variables among the world's poorest, most desperate population. Malthus understood that a

³³ UNICEF & Oxfam, Debt Relief and Poverty Reduction: Meeting the Challenge, 1999

³⁴ Netaid.org web-page on economic security sponsored by CISCO systems and UNDP.

³⁵ Netaid.org web-page on human security "what works" sponsored by CISCO systems and UNDP.

relationship between poverty and population growth existed, yet he failed to see how the links between these tragic circumstances, of war, famine, pestilence and population growth - could be broken.

By further proving the initial proposition that the nature of reproductive patterns consists of a non-cognitive component, and identifying the specific influences and triggers of such internal drives, it will serve to redirect policy to affect the perceived threat to one's existence which perpetuates this cycle. Policy makers must refocus goals to foster security in societies - and counter the threat mechanism that triggers procreation instinct. How can this be targeted? Answering this question will be a new challenge for policy makers. It is a challenge requiring the active involvement of social scientists, anthropologists and psychologists thus creating a tighter, more cohesive discussion and understanding of this phenomenon necessary to address the policy objective of lowered fertility rates or the stabilized population growth. Insuring a feeling of well being and continuity will require a multi-faceted approach and real efforts toward peace and stability throughout the international arena.

A reduction of fertility rates through social stability and improved social security, possible only through international debt relief for the world's poorest countries, will not only enhance the prospects of prosperity for future generations, but will benefit targeted societies immediately in advocating peace and stability today.

Appendix One

A. 1. Further research required to support the St. James Theory

Emphasizing again that this paper does not bear the burden of proving the *survival instinct hypothesis*, it seeks to introduce a new concept and paradigm into the way fertility rates and their determinants are perceived. There is clearly a lack of research to draw from where human evolutionary, biological studies are concerned. Furthermore, most current anthropological, psychological and health studies focus on human motivations related to the individual, not concerning the group thus may be less accurate than if they were accurately based on tribal conditions. As previously suggested, humans did not evolve or come to survive as individualist westerners; rather it is our heightened social organization ability that has granted our current dominance on the planet. Hence, the bulk of individually focused human experiments stray from the evolutionary reproductive truth that is the focus of this research.

Regardless of 'science world' political issues, there is ample investigation to be made that if carried out could very clearly support or negate *the survival instinct hypothesis* and general concepts of the St. James Theory on population growth presented thus far. In order to validate or disprove the hypothesis presented, at a minimum the following research shall be conducted:

A.1.1. Part one- Extended academic analysis

First, quantifiable, empirical data will be collected in the form of fertility rates, life expectancies, mortality rates and other determinates of social conditions in the selected case counties representing a wide array of social-economic development levels, cultures, and family

planning trends. Next, correlative charts shall display a multitude of the complex relationships that exist between the determinate factors. There is an existing wealth of information to be collected and reviewed demonstrating contraceptive prevalence, availability and residual demand for family planning services. It may be accessed the population authorities referred to in the Annotated bibliography as well as through Planned Parenthood Federation International and Population Action International both with based in Washington, D.C.

Required will be the development of chronological time tables demonstrating modern and historical patterns in social/ living conditions, including famines, wars, and droughts, etc. for the selected case countries. Fertility rates at various points along this time-table shall be recorded to the greatest extent possible and correlated with environmental disasters, wars, ice ages, any major environmental changes to find possible correlation with changes in biological, cultural, and situational factors affecting fertility rates.

Peace studies will formulate a major component of such a chronological analysis and seek to answer questions as, "What is the effect of harmony in these countries and the empowerment of women in these societies?" And, "How and to what extent do fertility rates shift before during and after times of violent conflict facing a society?"

Tribal societies in Sub-Saharan African countries represent the transition from ancient cultural norms to those growing from modern influences and infiltration of new customs. To examine cultural factors a case study should be made of Zimbabwe where the traditional practice of extended breast-feeding and abstinence linked to birth spacing is being diminished.³⁶ Actually fertility rates in Zimbabwe have declined rapidly in the past decade. Combined with the AIDS pandemic population growth has virtually stabilized.

³⁶ Yaw Oforu, Breast-feeding and Birth Spacing: Erosion of West African Traditions in Gender, Work and Population in Sub-Saharan Africa, (Geneva, International Labour Organization, 1994)

A.1.2. Special case studies / out-layers

Additional cases shall be researched when a particular country's demographic data demonstrates abnormal relationships or is viewed as an out-layer. Also the observation of patterns in countries with similar development status and historical peace and social evolution such as Spain and Italy as they maintain the lowest fertility rates in the world, even though they are predominately Catholic countries. A closer look at their current social trends may prove fruitful in explaining how they broke from religious traditions.

Inevitably some data collection will be required in the process of the data analysis, as research results will inspire new, already foreseeable questions. For example, certain out-layers to a general trend of decreased fertility rates correlating with higher life expectancy might be explained by the particular cultures' adherence to customs of strong fraternal interest groups. These cultural trends toward procreation present in ancient societies with strong fraternal interest groups are easily paralleled with modern societies displaying similar dynamics of power disparity between men and women. (I.e. religious fundamentalist regimes such as in Afghanistan, and Saudi Arabia where women are forbidden to drive cars.) Another distinguished parallel in persuasion for large families is present in societies noted for the Machismo pride of men where having many children is perceived as a testimony to their man-hood). As cultural trends themselves are largely products of instinctual drive, this male influence toward increased fertility rates stems from instincts developed in paternalistic societies, by understanding what conditions promote such trends, out-layers can be appropriately equated or dismissed in the analysis.

A.1.3. Data analysis plan - required results

As the hypothesis predicts that a general feeling of powerlessness and eminent danger trigger procreative behavioral and biological instincts, historical patterns of violence (war, civil-strife, inquisitions, (extreme hardships) other threats to society and their survival will need to be demonstrated within each country. When a chronology of these of these danger/ stress factors is developed, they shall be compared to demographic data of corresponding time frames. Researchers will seek a direct or inverse correlation between levels of hardship variance and those of fertility rates. Next, compare periods of violence and disease with increased fertility rates, subsequently analyzing other variables to deduce the relevance of each and to determine the significance of primal reaction to procreate. One research question to be considered includes, "Is there a strong correlation between periods of extraordinarily adverse living conditions and increased fertility rates?" Another required task at this point is to measure the prevalence of the other major variables perceived to be components of high fertility rates. Researchers will then analyze newly found patterns with the added variable of hardship to verify its significance as a contributing factor to in high fertility rates. In order for this hypothesis to be validated, a strong correlation should prevail supporting the theories of this proposal.

A multi-disciplinary approach will be taken to assess the sociological history of each case country, which will require the involvement of a social scientist, Anthropologist, Evolutionary Biologist and Psychologist to apply established theories to the evidence produced. For example, theories related to the phenomenon of people and animals instinctual reproductive patterns under conditions which instill insecurity of ones destiny. Results of social analysis- that while the population at large (and the female gender to be analyzed separately) feels in control of their own destiny (empowerment of the individual is implicit here) and thus eminent survival is anticipated, a relaxation in fertility rates should occur. This analysis should simultaneously measure all other

related independent variables, which should remain relatively constant and support a transition to replacement level fertility rates.

A.1.4. Part two- clinical studies: data collection and comparative analysis

An essential element of this study would utilize the modern ability to find out the number of days within a given time period women are actually biologically, clinically verifiably fertile. A natural family planning method developed in Germany utilizes a small computer that calculates a woman's temperature and vaginal moisture level to determine if she is fertile or not. Sample groups of women representing various populations living under diverse, quantifiable, measurable conditions could have their fertility levels recorded. In comparing their various fertility levels researchers would discover the extent that fertility corresponds to their different environmental factors, hence establishing a more scientific premise for a biological transition of human fertility rates determined by security and environmental factors.

Appendix Two

Policy Analysis Puzzle: An alternative model of the human security theory

Policy analysis worksheet:

Cases: Include demographic and social development data from countries represented in the World Bank's 1995 Data set.

Ind. Variable: (situational) Cultural norms / tribal customs => Women's status in societal power structure.

Ind. Variable: (situational) Agricultural society or not- reflects traditional need for large families.

Ind. Variable: (policy) Educational level of girls.

Ind. Variable: (policy) Access to family planning services.

Proposed Ind. Variable: Internal instinctual drive to have large families, triggered by lack of security and control of destiny.

Dependent/ Outcome Variable: High birth rates leading to unsustainable population growth.

Operationalization of Variables

I have selected four variables to be further studied and related to the fifth, proposed variable in this research. This is multi-disciplinary study in which both empirical and statistical research shall be conducted in application of the variables as well as the utilization of psychological, anthropological and scientific theories in order to validate my hypothesis. The empirical data to be called upon in the data collection plan is widely accepted and granted much

validity by the scientific community and researchers who use it in organizations such as the United Nations, World Bank and the World Health Organization. Such data used in the operation process of the following variable, as required for each, will be in the form of historical, cultural, descriptive logs/studies for diversity of cases, demographic, educational, health and family planning statistics, surveys and applied research theories.

A. Situational variables to be observed in selected case countries:

1. Culturally, is women's overall status in societal power structure high, medium, low?

Concept: This variable intends to qualify and analyze the level of female empowerment experienced in each society/culture studied. It will be measured for each case society by identifying the legal status of women. Does a woman have the right to vote, own property or work outside the home? Does she have first say in the decision making process of having children. When women's choices are limited in society the decision to have children is clear. In following ancient tradition women in cultures with strong male interest groups are valued for their reproductive capacity.³⁷ Furthermore strong male interest groups generally dis-empower their female counterparts. The operation of this variable seeks to measure the prevalence of traditional trends (present throughout our evolution- to variant degrees in various societies) today. With the isolation of this variable, researchers shall measure its relationship with fertility rates, and further analyze the resultant correlation.

2. Agricultural society or not?

³⁷ Karen Ericksen Paige, *The Policies of Reproductive Ritual*, (University of California Press, 1981), p. 126
The term "fraternal interest group" refers to societies that experience a disproportionate degree of male member power, power which is protected by their fraternal bond and maintenance of the status quo.

In response of either yes or no, a "no" answer would indicate predominance of an urban society. This factor is an indication of the traditional need for larger families in rural societies still being intact. Many children are generally desired for their contributing labor benefit in agricultural economies. In the transition to urban landscapes the cost of raising children usually increases while the marginal return of each child's income contribution decreases. Various additional factors present in urban life contribute to a decline in birth rates, which relate to policy variables. From a situational perspective however the internal, non-cognitive factors come in to play such as spatial issues- human reaction to crowding. This research is specifically interested in finding to what extent spatial issues and crowding initiate decreased fertility rates. The policy issues of health and education in cities will be studied independently and some variables are deeply related with the following policy variable and will be researched at length in this research project.

B. Policy Variables

3. What is the education level of girls?

Responses will entail the average number of years women have received formal education as well as the literacy rate of women. The education of girls, who become educated women, is considered the number one factor decreasing fertility rates. The focus of operating this variable is not to re-validate its influence here, but rather to study and better understand the relevance of female empowerment within it. How implicit is empowerment in education? This question begs the next, "Does feeling in control of ones destiny influence fertility rates?" A positive response to this question would greatly support my hypothesis. Psychologists and social anthropologists will apply the latter question during the final stages of research analysis, when all other research data is presented.

4. What level of access to family planning services exists?

This variable is qualified by the average distance (in kilometers) of family planning clinics (or locations offering such services) from peoples' dwellings, what variety of services are provided, and at what cost. -Are they affordable / economically accessible? In the advent that social conditions incur a demand for decreased fertility rates. The availability of contraceptives is a deciding factor in whether or not that demand for it will be met and the choice to limit family size can be effectively implemented. More importantly for this research, to effectively measure societal persuasions toward large or small families their ability to respond to such persuasions must be considered. Access to family planning services has a real influence of fertility rates. However it must also be considered that that while modern contraception, introduced over a century ago, has long been preceded by natural methods of birth control such as the rhythm method and birth spacing through extended breast-feeding for thousands of years.³⁸ Globally – across cultures (and species), the instinctual drive to have large families is triggered by lack of security and control of personal destiny.

While the previous four variables are established influences of the cognitive decision making process affecting fertility rates, the final independent variable of instinctual drive contributing to the outcome variable (high fertility rates) is deeply connected with all other contributing factors. This variable alone exacerbates poverty, just as the result- population growth is the common denominator of most the social, environmental and security challenges facing international policy makers today.

³⁸ Yaw Oforu, *Breast-feeding and Birth Spacing: Erosion of West African Traditions* in Gender, Work and Population in Sub-Saharan Africa, (Geneva, International Labour Organization, 1994)

Bibliography

Thomas Homer-Dixon, "*On the Threshold: Environmental Changes as Causes of Acute Conflict*", Peace and Conflict Studies Program, University of Toronto, International Security, Vol. 16, No. (Fall 1991) pp. 76-116 (MIT Press Journals, Harvard, Mass. 1991)

Lindsay Fairbanks, Plowing the Sea, (Harvard Business School Press, Boston MA, 1997)

Joseph A. McFalls, Jr. Population: A Lively Introduction. Population Bulletin, Third ed. Vol. 53, No. 3 (Population Reference Bureau Washington, DC, Sept. 1998)

Jared Diamond, Germs, Guns and Steel: the fates of human societies, (W.W. Norton and Company, Inc. New York, N.Y. 1999)

Population and Global Security, ed. Nicholas Polunin, (Cambridge University Press, Cambridge, UK. 1998)

UNDP POVERTY REPORT 1998: Overcoming Human Poverty, (United Nations Development Programme, New York, N.Y. 1998)

UNDP ZIMBABWE ANNUAL REPORT 1999: Promoting Sustainable Human Development, (United Nations Development Programme, New York, N.Y. 1999)

Population, Evolution, and Birth Control: A Collection of Essays, ed. G.H. Hardin, (Berkeley, University Press, 1969)

The New Politics of Population: Conflict and Consensus in Family Planning, ed. Jason L. Finkle, Alison C. McIntosh, (New York, Population Council, 1994)

Michael M. Cernea, "*Social Organization and Development Anthropology*," The 1995 Malinowski Award Lecture, Environmentally Sustainable Development Studies and Monographs Series No.6, (Washington, D.C., The World Bank, 1995)

Department for Economic and Social Information and Policy Analysis, Population Division, World Population Prospects, The 1996 revision, (New York, United Nations Oct. 1996)

Department of International and Social Affairs, Trends in Population Policy, (New York, UN 1994)

Lori S. Ashford, Population Bulletin, New Perspectives on Population: Lessons from Cairo, (Washington, D.C., Population Reference Bureau, Inc. March 1995)

Dennis Ahlberg, "*Population Growth and Poverty*," in Population and Development: Old Debates, New Conclusions, ed. Robert Cassen (New Brunswick, Transaction Publishers, 1994)

Robert E. Mazur & Marvellous Mhloyi, *"Women's Work & Fertility in Zimbabwe: Ending Underdevelopment with Change,"* in Gender, Work & Population in Sub-Saharan Africa, ed. Adepoju & Opong, (Geneva, International Labour Organization, 1994)

Yaw Oforu, *"Breast-feeding & birth Spacing: Erosion of West African Traditions,"* in Gender, Work & Population in Sub-Saharan Africa, ed. Adepoju & Opong, (Geneva, International Labour Organization, 1994)

Raylynn Oliver, LSMS Working Paper No. 111: Contraceptive Use in Ghana: The Role of Service Availability, Quality, and Price, (Washington, D.C., The World Bank, 1995)

Thomas G. Weiss, David P. Forsythe, Roger A. Coate, The United Nations and Changing World Politics 2nd edition (Boulder, CO., Westview Press, 1997)

World Development Report 1997: The State in a Changing World, (Washington, D.C., The World Bank, 1997)