

## Intergenerational Transmission of Wealth in Hadza

### **1. Wealth, Absence of Land or Moveable Property**

The Hadza are hunter-gatherers who live in the Lake Eyasi area of northern Tanzania. Their habitat is savannah woodland with a 6 month rainy season and a 6 month dry season. They have been described by several European observers throughout the 20<sup>th</sup> century (Bleek 1931, Kohl-Larsen 1958, Obst 1912). Since 1958, when Woodburn (Woodburn 1964) began his doctoral studies, the Hadza have been almost continuously studied by anthropologists. Beginning in 1982, regular censuses and anthropometric measurements have been conducted first by Nicholas Blurton Jones (Blurton Jones 2006, Blurton Jones, Hawkes, and O'Connell 2002, Blurton Jones et al. 1992) and after his last trip in 2001, by me (Marlowe in press).

The Hadza possess no wealth in the form of land or moveable property. Moveable property that does exist consists of the items that follow. Bows and arrows are owned by all males above the age of 3 years. Among teen-agers and adults, each male makes his own bow and arrows. Most men also own a knife they make themselves and these days German knives I give them as payment for my research. These might only last one or two years. Many men also own an ax which they make after trading meat or honey to get the iron blade already shaped by a non-Hadza blacksmith. In addition, men own the clothes and beads they wear, a pouch for carrying tobacco or arrow poison, and about one-third of men might own a hammer they use to pound nails into arrow heads. Women own a digging stick with a lifespan of about 1-2 months, sometimes a self-made straw basket, about 2/3 own a metal cooking pot, their clothes and beads.

## **2. Transmission of Wealth**

The Hadza are mobile and move to a different location about every 6 weeks. Their camps include a mean of 30 people (median = 21) and members of a camp frequently change as people move in or out. Partly due to their mobile lifestyle, there is no ownership of land – not even any claims to rights by people of a certain region of Hadzaland. In fact, even compared to most foragers, the Hadza are remarkably non-territorial (Woodburn 1968a, Woodburn 1968b). People can move wherever they like. There is constant visiting between camps so people know where others are living. Given that there are choice places to locate camps to be close enough to drinking water and good shade trees or berry bushes, a while group of people do not typically try to move to a spot that is already occupied though individuals will move into an already existing camp. For all of the above reasons, both land and moveable property can be ignored here. The few possessions people do own are not inherited in any standard way if at all when people die. As noted, men and women make their own tools and clothes (or get them from me as gifts), they quickly wear out, and when they die, anyone living nearby will acquire an item with the same probability as a child would or some other relative.

## **3. Sample**

I used anthropometric measures for the simple reason that these data were already entered and there is a large sample, so there are plenty of parents and offspring included. I have been collecting my own anthropometric data continuously since 2001 in every camp that I have worked in up through early 2006. The data come from a total of 49

camps over much of 6 years. We measure all people except for infants; on them we measure only weight. There are no biases in these data unless one considers that among all 1000 or so Hadza, we tend to work in the best camps for studying foraging. Some people appear only once but many appear several times and some many more times than others. These would be those in the best foraging camps, perhaps 300-400 people. In all cases of multiple appearances I used the one most recent appearance in order to increase the chances of getting children who are older for better comparisons with their parents.

#### **4. Details of Wealth Measures**

Wealth measures used include height, weight, percent body fat (%BF), body mass index (BMI), and grip strength. Height is measure with a stadiometer, weight and %BF with a bioimpedance scale, BMI as  $\text{wt (kg)/ht (m)}^2$ . Grip strength was measured using a Smedley III Analog Grip Dynamometer. In the future I could perhaps add foraging success measured as foods brought back to camp; those consumed out of camp are also documented but not all entered yet.

#### **5. Pairings**

There was no clear reason to limit pairings so all possible dyads are used. I did not analyze the data myself but rather sent them to Adrian Bell. The one dyad that unfortunately I did not tell Adrian to try but which in future we must try is father-mother means against offspring. Most anthropometric traits (e.g., height and weight) are polygenic so that both parents contribute. This means that the mean height or weight of mother and father is the best measure to use for comparison with child but unfortunately

those pairings have not yet been run. If there is no assortative mating for height then we should find that there will only be an association between the child's height and the mean of the parents. If there is assortative mating for height then of course children who have tall parents will likely be tall themselves.

## **6. Parameter Estimates/Results... and**

### **7. Interpretation**

In most of my wealth measures  $\beta$  coefficients are low. This is likely because these traits are polygenic and will be stronger once we calculate father/mother mean values and pair those up with sons and daughters, as well as look at brother-sister, sister-sister, and brother-brother for signs of sex links. I will do this in the near future. There is little reason to conjecture about the low  $\beta$  values until this is done. With the pairings so far the highest values were for FD height, MD weight, FS BMI, as well as MS and MD grip strengths. All are in the range of .13-.14.

Sources of errors include the occasional malfunctioning weight scale, especially for %BF which depends on clean enough feet for the bioelectrical impedance to work properly. Another source of error is writing in the field or typing when entering data. These should be minimal with little effect in such a large sample. A more troubling source of error is the tendency for people to claim stepchildren as their own. The Hadza do this frequently. They know that I am after genetic children but still I often have to remind them. Finally, there is the possibility of cuckoldry. It is difficult to say how high this may be among the Hadza. In many cases children look so similar to their fathers that one feels confident he is the father. Even women sometimes claim children that are really the children of their sisters who have died. The trickiest cases are the ones where

men have raised the children of their dead brother since the Hadza often practice the levirate. After growing up most of their life with their uncle people really think of him as father and it takes more work to discern these relationships. Fortunately, I have the benefit of access to the data of Blurton Jones who has been conducting censuses since 1982 and many relationships can be clarified with people whose father or mother died after that time.

In the near future, education can be analyzed in terms of number of years in school. I do not expect there to be strong  $\beta$  coefficients mainly because there are very few people over 40 and almost none over 50 years of age who attended any school. Even for most of those in recent times who have attended, it is usually for just one or two years. In the future, RS can be analyzed. I normally use number of living offspring, controlled for age. Given that I have a large enough sample, I could probably limit the sample to those over 25 years but as men continue to reproduce into their late 50's and early 60's, this still might be a problem. Mortality to age one is 22% and 46% to age 15 years (Blurton Jones, Hawkes, and O'Connell 2002). Finally, in the future I can add hunting reputation for males and tuber digging reputation for females. These data are collected by asking people to name the three best in their own present camp. Many of these data are already collected but not all entered nor standardized for camp population.

## 8. Bibliography

- Bleek, D. F. 1931. The Hadzapi or Watindega of Tanganyika territory. *Africa* 4:273-285.
- Blurton Jones, N. 2006. "Contemporary hunter-gatherers and human life history evolution," in *The Evolution of Human Life History*. Edited by K. Hawkes and R. Paine, pp. 231-266. Santa Fe: School of American Research Press.
- Blurton Jones, N. G., K. Hawkes, and J. F. O'Connell. 2002. Antiquity of postreproductive life: Are there modern impacts on hunter-gatherer postreproductive life spans? *American Journal of Human Biology* 14:184-205.

- Blurton Jones, N. G., J. F. O'Connell, K. Hawkes, C. L. Kamuzora, and L. C. Smith. 1992. Demography of the Hadza, an increasing and high density population of savanna foragers. *American Journal of Physical Anthropology* 89:159-181.
- Kohl-Larsen, L. 1958. *Wildbeuter in Ostafrika: Die Tindiga, ein Jager und Sammlervolk*. Berlin: Dietrich Reimer Verlag.
- Marlowe, F. W. in press. *The Hadza: Hunter-Gatherers of Tanzania*. Berkeley: University of California Press.
- Obst, E. 1912. Von Mkalama ins land der Wakindiga. *Mitteilungen der Geographischen Gesellschaft in Hamburg* 26:2-27.
- Woodburn, J. 1964. The Social Organization of the Hadza of North Tanganyika. Ph.D., Cambridge.
- . 1968a. "An introduction to Hadza ecology," in *Man the hunter*. Edited by R. B. Lee and I. DeVore, pp. 49-55. Chicago: Aldine.
- . 1968b. "Stability and flexibility in Hadza residential groupings," in *Man the Hunter*. Edited by R. B. Lee and I. DeVore, pp. 103-110. Chicago: Aldine.

Table 1. Betas for all pairings.

Site	Wealth type	Pairing	N pairs	$\beta$	SE
Hadza	Height	FS	215	-0.068	0.17
Hadza	Height	FD	214	0.13	0.18
Hadza	Height	MS	269	0.069	0.22
Hadza	Height	MD	298	0.29	0.18
Hadza	Weight	FS	215	-0.06	0.16
Hadza	Weight	FD	225	-0.12	0.17
Hadza	Weight	MS	277	-0.043	0.08
Hadza	Weight	MD	308	0.14	0.15
Hadza	BMI	FS	203	0.13	0.14
Hadza	BMI	FD	212	-0.059	0.13
Hadza	BMI	MS	265	0.087	0.056
Hadza	BMI	MD	265	0.077	0.12
Hadza	PrctFat	FS	175	-0.031	0.073
Hadza	PrctFat	FD	203	-0.15	0.069
Hadza	PrctFat	MS	229	-0.025	0.065
Hadza	PrctFat	MD	281	-0.045	0.080
Hadza	Grip Stren	FS	171	-0.11	0.13
Hadza	Grip Stren	FD	179	-0.16	0.36
Hadza	Grip Stren	MS	226	0.013	0.071
Hadza	Grip Stren	MD	255	0.14	0.082