



Original Article

Eat first, share later: Hadza hunter–gatherer men consume more while foraging than in central places



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ABSTRACT

The foraging and food sharing of hunter–gatherers have provided the backdrop to several different evolutionary hypotheses about human life history. Men's foraging has often been characterized as primarily targeting animals, with high variance and high rates of failure. To the best of our knowledge, however, there are as yet no quantitative studies reporting the amounts of food that men eat while foraging, before returning to their households either empty-handed or with foods. Here, we document this under-reported part of forager's diets—men's eating while out of camp on foray. Our dataset consists of 146 person/day follows (921 hours total) collected over a period of 12 years (from 2001–2013, including 12 camps). Hadza men consumed a substantial amount of food while out of camp foraging. Men did more than just snack while out of camp foraging, they consumed a mean of 2,405 kilocalories per foray, or approximately 90% of what is estimated to be their mean daily total energy expenditure (TEE). The characterization of men's foraging strategies as “risky”, in terms of calorie acquisition, may be exaggerated. Returning to camp empty-handed did not necessarily mean the forager had failed to acquire food, only that he failed to produce enough surplus to share. Surprisingly, the vast majority of the kilocalories eaten while out of camp came from honey (85%). These observations are relevant to evolutionary theories concerning the role of male provisioning. Understanding primary production and consumption is critical for understanding the nature of sharing and the extent to which sharing and provisioning supports reproduction in hunter–gatherers.

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1. Introduction

Knowledge of food sharing and the sexual division of labor in hunter–gatherers is mostly based on the distribution of foods at central places (e.g. Bahuchet, 1990; Kitanishi, 1998; Ziker, 2007), or in mixed-sex or single sex groups (e.g. Kaplan, Hill, Hawkes, & Hurtado, 1984; Ziker, 2002). In groups that split apart (fission) to forage as individuals or in smaller groups and then bring foods back to camp to share (e.g. central place provisioners) (Marlowe, 2006), it is logistically difficult for researchers to record the behavior of those in camp and those foraging out of camp at the same time. It is probably largely due to these logistical problems that studies of food sharing in central places are so much more common than studying out of camp behavior (e.g. Bahuchet, 1990; Bird & Bird, 1997; Gurven, 2004; Kaplan, Hurtado, & Hill, 1990; Speth, 1990; but see Crittenden (2013) as a noteworthy exception). In fact, these studies are so common that students of

anthropology often have the impression that all foods acquired are brought back to the residential group to be shared with others. This impression is easy to understand in light of statements like those of Marshall (1998:71,77) who, despite documenting out of camp eating by the Nye Nye !Kung, goes on to write “!Kung are quite conscious of the value of meat-sharing and they talk about it. The idea of sharing is deeply implanted and very successfully imposes its restraints.... The idea of eating alone is shocking to the !Kung. It makes them shriek with an uneasy laughter. Lions could do that, they say, not men.”

Nevertheless, many ethnographers report hunters eating spoils before returning to camp, including the Ache, Aka, Batek, G/Wi, Lengua, Mbuti, Nukak, and !Kung (Endicott 1988; Grubb, 1911:190; Lee, 1979; Marshall, 1976; Politis, 2009; Silberbauer, 1981; Walker & Hewlett, 1990). However, analyses of producer generosity and patterns of sharing, to date, have not systematically taken this out of camp eating into account. The difficulties of systematically capturing these data are sometimes lamented (e.g. Politis, 2009; Speth, 1990). In other cases, ethnographers document total quantities of foods acquired but do not mention whether any of the foods were consumed before foragers returned to camp (Endicott, 1988; Hart, 1978).

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Patterns of eating while out of camp may lead to small or even large corrections to estimates of the total diet of hunter–gatherers. These data also inform studies of food sharing practices in camp. Decisions to share foods, or to request foods from others, are necessarily affected by how hungry or satiated individuals are when they return to camp. Thus, studies that are based solely on in-camp behavior can provide only part of the larger picture of the diet and food sharing practices of central place provisioners. For example, Hadza men have been documented eating on average only 8% (median 0%) of the total caloric value of foods they brought back to camp (Wood & Marlowe, 2013). In the absence of information on out of camp eating, this paints an unrealistic picture of food distribution and overall diet. Men eating while out of camp sheds light upon their patterns of sharing when in camp. Not considering data on out of camp eating would lead to overestimations of both the failure rate of men's foraging decisions, and the degree to which their energetic budgets are subsidized by others. These data call attention to the fact that characterizing patterns of diet by sex, age, marital status, or other factors should involve careful considerations of how individual diets vary across space, relative to where researchers make their observations. Our analysis indirectly bears on previous interpretations of data on patterns of food distribution in hunter–gatherers, and has consequences for our understanding of the evolution of hunting.

2. Materials and Methods

2.1. Subject Population

The Hadza are a group of traditional, central-place hunter–gatherers who number approximately 1,000, however only approximately 250 individuals still acquire the majority of their diet by foraging. They live in a savanna–woodland habitat that encompasses about 4,000 km² around Lake Eyasi in northern Tanzania. They live in mobile camps, averaging 30 individuals per camp (Marlowe, 2006). Camp membership often changes as people move in and out of camps (Blurton Jones, Hawkes, & O'Connell, 2005). Hadza camps move about every 6 weeks, on average (Marlowe, 2010).

While foraging, Hadza men typically search for animals, honey, and sometimes fruit. Hadza men rarely dig for tubers, which is a task that women and sometimes children specialize in. They typically go on walkabout every day, and they usually go alone. They hunt birds and mammals using only bow and arrows. In large game kills poison arrows are used, whereas with small game poison is not used. They always have their bow and arrows with them, even when they carry an ax to access honey (Marlowe, 2010).

The Hadza diet can be conveniently categorized into six main food types: honey, meat, berries, baobab (*Adansia digitata*), and tubers, and in one region only, marula nuts (*Sclerocarya birrea*). The berries that the Hadza eat consist mostly of seed encased in a small amount of high-sugar pulp. Baobab fruit is common across much of Africa, and it is a major food in terms of kilocalories and kilograms in the Hadza diet. Many tubers are continuously available throughout the year, and are a source of carbohydrates and an important 'fallback food' for the Hadza (Marlowe & Berbesque, 2009).

2.2. Procedure

Men were followed on walkabout, their behaviors were continuously recorded from the time they departed camp to the time they returned to camp. Men usually begin their day of foraging early, between 6 and 7 am. Hadza men forage opportunistically and even if they have a particular goal in mind, such as looking for bee nests in a particular stand of trees, they are generally alert for other foraging opportunities. The researcher followed approximately 5–10 meters behind the focal individual(s), recording a variety of behavioral data, including every instance in which they ate foods. While observing the Hadza, the researcher walked as silently as possible, attempting to minimize observer effects, and

providing no direction whatsoever to the Hadza about where or how to forage or behave during any of the observations.

Focal individuals selected using simple random sampling without replacement, with the goal of following all males in residence in each camp at least one time, regardless of whether the focal individual was alone or in a group. In contrast to some other ethnographically documented hunters (e.g. Alvard, 2002; Hill, 2002), Hadza men very often forage alone (Marlowe, 2010). A total of 118 follows were conducted, most of which were of men foraging alone, though in 13 cases (11% of follows), more than one person was present (group foray) and data were also collected on non-focal individuals. Data on non-focal individuals in a group follow were only analyzed when all group members were present and observed throughout the foray. Due to group follows, these 118 follows constitute our focal sample of 146 person/follows. The mean number of men present in group focal follows (as opposed to follows of a single individual was 4.6 (mode = 3, maximum = 8). Our focal follow data consists of totals 146 person/day follows (921 hours total) collected over a period of 12 years from 2001 to 2013, with follows in every region of Hadzaland and in every season (see Table 1 for a breakdown of follows by region and season). The average duration of follows was 6.3 hours per foray, with a range of 30 minutes for the shortest foray to 770 minutes (or 12.8 hours) for the longest foray. On average, each of the 75 men followed was observed 1.95 times (median = 1 and mode = 1), with a range of 1–9 observation days per man. However, only 8 (11%) of the 75 men were followed on more than three person days, and many of these repeat follows of the same individual happened in different years. The men followed ranged in age from 16 to 59 years old, with a mean age of 35 years (median = 34 years, mode = 41 years). Most forays (90%) lasted 2 hours or longer.

Amounts (kilograms) of foods eaten on focal follows were estimated using methods similar to those outlined by Rothman, Chapman, and Van Soest (2012). This entails visual estimation of units of foods consumed (e.g. three handfuls of berries) and the collection of corresponding data that allows one to estimate the weight of such units (e.g. the

Table 1
Person/Follows by Region and Season.

Year	Region	Season	Camp	Follows
2001	Dunduiya	Early dry	Sungu	2
2002	Tli'ika	Early wet	Bashana	3
2002	Tli'ika	Early dry	Gibanola	2
2003	Siponga	Early wet	Sedaiko	4
2003	Tli'ika	Early dry	Sangeli	3
2004	Siponga	Early wet	Sedaiko	13
2004	Tli'ika	Early dry	Kisanakwipi	8
2004	Tli'ika	Late dry	Sanola	1
2005	Dunduiya	Early dry	Mayai	13
2005	Dunduiya	Late dry	Wamkwimba	3
2005	Mangola	Early dry	Gola	6
2005	Mangola	Late dry	Gola	1
2005	Siponga	Early wet	Tuwa	1
2005	Siponga	Early wet	Siponga	1
2005	Siponga	Late wet	goandeka	1
2005	Siponga	Late dry	Tuwa	22
2005	Tli'ika	Early dry	Gangidape	4
2005	Tli'ika	Early dry	Bashana	4
2006	Mangola	Late wet	Gola	4
2006	Mangola	Early dry	Gola	10
2006	Tli'ika	Early wet	Kisanakwipi	7
2006	Tli'ika	Late wet	Lelangidako	9
2006	Tli'ika	Late dry	Hukumako	12
2009	Han!abe	Late dry	Setako	4
2010	Tli'ika	Late wet	Sangeli	1
2010	Tli'ika	Early dry	Sangeli	4
2011	Tli'ika	Early wet	Sangeli	1
2012	Tli'ika	Early wet	Sangeli	1
2013	Tli'ika	Early dry	Nyalaida	1
12 Years	5 Regions	4 Seasons	29 Camps	146 Follows

In this study, we define a camp by both the geographic location and the season of researcher presence.

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