HOUSEHOLDS AND CHILDREN: A PROXY FOR IDENTIFYING JUVENILES IN THE ARCHAEOLOGICAL RECORD

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ABSTRACT

The current state of archaeological middle range theory provides a poor basis for differentiating between households with and without children. This study represents a cross-cultural analysis of ethnographic data from six groups practicing extremely diverse life ways: the Copper Inuit, the Klamath, the Garo, the Kapauku, and the Ju/'hoansi, as well as data collected by the author among the Dukha of northern Mongolia. Occupational density data from adult-only households compared to those with children support the hypothesis that households including juveniles are occupied at significantly higher densities than those without them. Additionally, household density significantly increases with ratio of children per household. Most studies attempting to identify juveniles in the archaeological record focus on material residues directly deposited by them, such as toys. This paper presents the results of a study focused on patterned demographic differences at the household-level instead.

INTRODUCTION

Children and childhood have been topics of growing interest within the discipline of archaeology since the mid-1990s (Baxter 2008). Most studies attempting to identify children archaeologically seek out material residues directly deposited by them, such as toys or child-exclusive activity areas (Ferguson, 2008: 51; Lillehammer 2010: 16; e.g. Baxter 2005). Others have attempted to identify instances of novice craft production (e.g. Crown 2001; Finlay 1997; Högberg 2008) or suggested that children might be visible in the unique role they play in cultural change (Smith 2006). Largely absent from these approaches is a view directed towards patterned changes in the use of space that result from children's presence.

Though the precise definition of child is culturally relative, juveniles are biologically, behaviorally, and cognitively differentiable from adults (MacDonald 2007). It follows that the age structure of a household's occupants ought to be visible in patterned archaeological residues produced either by the children themselves or by adults in the process of caring for them. This research generates one prospective proxy variable (household occupational density, calculated as the number of people per square meter of household floor space and hereafter referred to as HOD) for identifying households with children in the archaeological record.

BACKGROUND: NAROLL'S CONSTANT

For at least half a century, archaeologists have attempted to obtain demographic information from floor area. Generally, these studies endeavor to identify a cross-cultural "magic number" indicating how many people, on average, live per square meter of roofed floor space in order to calculate population estimates for entire archaeological sites (Brown 1987; Casselberry 1974; Cook et al. 1968; Kolb 1985; Kramer 1980; Leblanc 1971; Naroll 1962; Porcic 2012; Wiessner 1974). Naroll represents the earliest of these studies, finding that "the population of a prehistoric settlement can be very roughly estimated by archaeologists as of the order of one-tenth of the floor area in square meters occupied by its dwellings" (1962: 588).

"Naroll's Constant" sparked great interest and inspired a slew of response papers. These ensuing studies have built significantly upon Naroll's work, recognizing that confounding variables will alter the effectiveness of these population reconstructions (Casselberry 1974; Cook et al. 1968; Wiessner 1974). In the most comprehensive evaluation of "Naroll's Constant," Brown (1987) argues that a more useful worldwide population constant is six meters squared per person, which is obtained by calculating average household size to average household floor area contra to Naroll's (1962) total population to total household floor area. Though he presents his own magic number, Brown simultaneously cautions that he cannot confirm "a theoretical explanation for this finding" and that more research in this area is needed (1987: 36) . In this vein, Leblanc suggests that there is considerable variation in household size per family, so that "any given household is unlikely to be a good indicator of the village average" (1971: 210).

Indeed, Porcic argues that residential mobility significantly affects the average household size to household area ratio (2012); unsurprisingly, nomadic and predominantly mobile groups are characterized by a significantly lower ratio than sedentary groups. In a wider context, he calls for future research to identify additional variables that could explain variation in this ratio (Porcic 2012: 82). These variables might include "marital patterns, economic differences, technological innovations, culture change, and differences in family composition" (Kolb 1985: 82).

Rather than refining Naroll's cross-cultural magic number, this study focuses on one of these intra-cultural variables potentially affecting HOD: differences in family composition as characterized by the presence and quantity of children within households. Within a single culture, households with children should be occupied at relatively higher HODs than households without children (Baldassare 1981) and HOD should increase as the ratio of children per household increases.

DETERMINING ARCHAEOLOGICAL HOUSEHOLD OCCUPATIONAL DENSITY

Despite archaeologists' ardent interest in reconstructing past population densities in general, we have and continue to experience difficulties in producing "valid and usable data" (Renfrew 2009:382). More work in obtaining demographic information from archaeological remains is sorely needed (Porcic 2012), particularly at the household level and especially since non-demographic factors, such as economic differences, can affect dwelling size (e.g. Kolb 1982; Kinoshita 1995; Wilk and Rathje 1982). There are two potential ways to extract this information: estimating relative HOD directly, or determining household size and dividing by floor area.

The usefulness of many large-scale, archaeological population reconstruction techniques for estimating individual household population is questionable (see Hassan 1981: 72-83 for a review of these methods). For example, many archaeological scholars have used human remains or mortuary features such as tombstones to reconstruct past population size (Schacht 1981). This strategy is generally not useful for reconstructing individual household size, and may not be helpful at many prehistoric sites in the United States for ethical and legal reasons (e.g. Lawler 2010). Faunal and ceramic studies, on the other hand, have provided some preliminary methods that could potentially be used for reconstructing intra-household population. Most of these studies took place decades ago; there has been very little progress on this front in the past quarter of a century as evidenced by a lacuna of intra-household population studies in more recent reviews of archaeological demographic analysis (Bocquet-Appel 2008; Chamberlain 2006; Paine 1997).

Some faunal-based human population estimates have been built through extrapolating the amount of meat present at a site to subsistence requirements on an individual level (something that could potentially be reconstructed for each separate household if they do not share midden areas). Wheat (1972), for example, considers edible biomass, processing time, consumption rate, and weight of preserved meat that one person could carry at the Olsen-Chubbuck bison kill in order to estimate the number of people involved. Similarly, Ascher uses amount of mussel shell screened from a shell midden to calculate total grams of protein consumed at that site, and then converts this into a population estimate by controlling for average grams of protein eaten by each person per day and number of days the shell midden was used (1959). However, faunal strategies would be problematic in this case because children consume fewer calories than adults. In households with children, population estimates based on caloric requirements would appear systematically lower than they should.

Martin uses seasonality, estimated task group size, and optimal resources to estimate the number of people belonging to hunter-gatherer groups (1973). This would also be difficult to apply at the household level since task groups may be comprised of people from many different households. Additionally, his model encompasses a number of assumptions regarding sexual division of labor and age at which subsistence tasks, such as hunting, are first performed. These assumptions reduce any cross-cultural validity such a model might otherwise have.

Where other archaeological subdisciplines are decidedly lacking in middle range theories for reconstructing prehistoric populations on a household level, ceramicists have proposed several intriguing ideas. Turner and Lofgren represents a pioneering study that estimates Ancestral Puebloan population size by measuring mean cooking jar capacity and mean dining bowl capacity, and calculating the ratio between them to obtain household size (1966) . The implication of this study is that the larger cooking vessels used in a household, the more people that lived there. Nelson confirmed the existence of a weak correlation between cooking jar capacity and household size, but expresses doubts as to how useful this is for archaeological interpretation (1981). His criticisms are well founded, especially since cooking vessels may not be discarded within the households in which

they were used; ceramics often break outside the household (Tani 1994). However, other scholars have also confirmed and built upon the relationship between cooking vessel size and number of people per household, noting additionally that the larger the household the more pots and hence more potsherds produced (Arthur 2009; Tani 1994). They generally claim that this is the case because more people produce more trash (after Rathje and Murphy 1992: 141). Others have argued that relative proportions of different ceramic vessel types are better indicators of household size than potsherd density (Hildebrand and Hagstrum 1999).

Cleaning behavior represents an additional consideration. If it is indeed true that more people produce more trash, then larger households ought to clean more often than smaller households. Cleaning behaviors tend to result in the displacement of large artifacts while microrefuse remains in its original depositional context (Metcalfe and Heath 1990). Because of this, the density of very small potsherds or other micro-artifacts from within households might be a better indicator of intra-household population density than total artifact density. As far as I am aware, this specific idea has not been tested.

Ethnoarchaeological studies examining artifact types other than ceramics with the purpose of estimating intra-household population need to be conducted. Furthermore, most existing studies that attempt to reconstruct household population based on material residues are either completely bivariate or only examine one variable's effect on household size at a time. A model considering multiple variables in tandem could potentially be used to reconstruct household population or relative household density with much greater effectiveness (Schacht 1981: 123 footnote). Ongoing research by the author using multivariate modeling to predict household density from directly measurable material residues (using Yellen's [1977] data) has produced a significant correlation between actual and predicted values, indicating that such a method might have some analytical value, pending cross-cultural testing.

In addition to previously proposed methods, archaeological artifact density (an easily measurable archaeological variable) could be used as a relative indicator of household size. As mentioned earlier, artifact density is proportional to household size based on the assumption that more people produce more trash (Rathje and Murphy 1992: 141). Since artifact density can be seen as a function of the number of household occupants (household size), per capita discard rate, and occupation span (Surovell 2009: 68), at sites where occupation span between households is similar and evidence of cleaning behavior is minimal (Metcalfe and Heath 1990), relative household size should be reflected by relative differences in artifact density. In these cases, archaeologists should expect households with juveniles to exhibit higher artifact densities than households without them. Many tipi ring sites across the Great Plains of North America, for example, meet these criteria.

METHODS

Very few ethnographies contain quantitative characterizations of household floor area that are linkable to both the number and age of household occupants. For this study, data from six cultural groups were collected (Tab. 1 and 2): the Garo (Burling 1963), the Copper Inuit (Jenness 1922), the Kapauku (Pospisil 1972) the Klamath (Spier 1930), the Ju/'hoansi (Yellen 1977), and the Dukha (collected by the author, summer 2013).

The Garo

Sedentary agriculturalists of northern India (Burling 1963: 15), the Garo live in small (approximately 300 people) villages, in substantial, permanent bamboo house structures (Burling 1963: 21). Demographic (Burling 1963: 325-8) and areal (Burling 1963: 26) data are available from sixty Garo households. The sample includes monogamous and polygynous households as well as single and multi-family houses (Burling 1963: 128). Burling (1963: 324) defines adults at "those approximately past puberty," so it is assumed that children are pre-pubescent or pubescent individuals. Burling (1963) does not report quantitative data for household areas, so these were measured to the nearest half-millimeter with a one-millimeter ruler off a scaled village map (26). These dwellings are all rectangular, so floor area was calculated as length x width.

The Copper Inuit

Jenness (1922) records the anthropological results of the Canadian Arctic Expedition of 1913-18. The Copper Inuit live in the Canadian Arctic Circle who mainly depend on the hunting of sea mammals, fish, and caribou to fulfill their subsistence needs (Jenness1922: 15, 17). Jenness (1922: 56-82) includes a section illustrating and describing several snow huts and their inhabitants. These all appear to be single-family households, three of which include demographic and areal information. They all seem to represent monogamous households, but the Copper Inuit do practice polygyny in some cases (Jenness 1922:159). For these data, "child" was defined (after Yellen 1977:103) as a person who had never been married and was living with his or her parents. Measurements for the diameters of the circular snow huts were provided by Jenness (1922:65, 68-9); area was calculated as $\pi r2$.

The Kapauku

The Kapauku live in the Kamu Valley of western New Guinea. They are almost exclusively agriculturalists (Pospisil 1972: 78). Houses are thatched plank, rattan, and reed structures, the size of which is influenced by economic status (Pospisil 1972: 258-9). Demographic (Pospisil 1972: 420) and areal (Pospisil 1972: 173) data are available for fourteen households. Most of these households include augmented or extended monogamous families, but one includes a single nuclear family and several are polygynous (Pospisil 1972: 76). Children are defined as individuals that are thirteen years of age or older (Pospisil 1972: 59, 411-415). Household areas were measured to the nearest half-millimeter with a 1-millimeter ruler off a village map (Pospisil 1972: 173). All buildings are rectangular, so area was calculated as length x width. In some cases, there were multiple structures associated with each household. In these cases, floor area was calculated as the additive area of all structures' floors.

The Klamath

The Klamath are a Native American group living on the northern half of the high plateau of eastern Oregon (Spier 1930: 8). They are hunter-gatherers, focusing mainly on fish for subsistence (Spier 1930: 145). Spier (1930: 53-54) notes that it is difficult to acquire data on household composition,

but he details information about two multi-family earth lodges. Though the examples used here are of monogamous households, the Klamath are polygynous in some cases (Spier 1930: 54). Spier distinguishes between adults and children; presumably he refers to children as pre-pubescent individuals (Spier 1930: 61) but he does not explicitly state this. He provides diameter measurements for the earth lodges, so area was calculated as $\pi r2$.

The Ju/'hoansi

These hunter-gatherers live on the semi-arid northern edge of the Kalahari Desert (Yellen 1977: 13-14). "Very few activities take place inside a hut," (Yellen 1977:87) but they provide shelter from rain during the wet season or shade from the sun during the dry season. Rainy season huts are dome-shaped, structured with branches and thatched with grass, while dry season huts may be comprised only of several upright branches planted into the ground (Yellen 1977:86-7). Yellen informally notes occupational density is higher among households with children than households without by stating that "two adults do not take up significantly more space than two adults and four young," (1977: 115) although he is referring to "nuclear area scatters" (109) and not dwelling floor area. These data differ from those derived from other ethnographies since Yellen follows the same twelve household groups and maps their associated living spaces at fourteen camps; data from all fourteen camps was used to calculate floor area. Hence, pseudo replication is built into this dataset. Most of these household groups are monogamous nuclear families, but one is polygynous and two are bachelors (Yellen 1977: 56). Children are defined as unmarried individuals that share huts and hearths with their parents (Yellen 1977:103). Household areas were measured off of inset maps located in the back of the book. Area was calculated by measuring the diameter of a circle, the diameter of a half-circle, the length and width of an ellipse, or could not be determined if the "hut" was only a wall. All measurements were taken to the nearest millimeter with a one-millimeter ruler.

The Dukha

The Sayan Mountains, home of the Dukha reindeer pastoralists, is perhaps the region where reindeer (Rangifer tarandus) were first domesticated (Whitaker 1981:347) beginning approximately 3,000 years ago (Vietibsky 2005: 25). This area is a transitional zone between taiga (Siberian boreal forest) and alpine tundra (inner Asian steppe); it also represents the southernmost extreme of reindeer pastoralism in the world (Donahoe 2003). Walker (2009) notes that what the Dukha refer to as "taiga," the habitat in which they and their reindeer live, is actually mountain-tundra plateau located above alpine tree line. The data used in this study were collected during the summer of 2013 from a Dukha camp located in the Right Taiga.

Unlike indigenous reindeer-herding groups that live in northern Siberia, northern Europe, or Alaska, the Dukha practice small-scale or intensive (Whitaker 1981: 343) reindeer pastoralism with median herd sizes of twenty to thirty reindeer per family, raising them primarily for dairy products and transportation purposes (Ermolova 2003, Fijn 2011: 133). The Dukha traditionally combined pastoralism with hunting for subsistence (Shirokogoroff 1929: 27; Whitaker 1981: 342). The Dukha also live a nomadic lifestyle, moving camp at least four times per year, and residing primarily in mobile, conical dwellings (Walker 2010: 71) called ortz (Surovell and O'Brien 2016).

In this study, number and age of household occupants for families occupying summer ortz was recorded during interviews by Dr. Todd Surovell (University of Wyoming). The maximum diameter (L) and cross section (W) of each ortz were measured to the nearest tenth of a meter with a metric tape measure. Floor area was calculated as an ellipse ($\pi LW/4$) and children were defined as under the age of thirteen.

Other Methodological Considerations

Several consistency problems exist between these datasets, most notably that the definition of "child" varies between ethnographies. I chose to use each anthropologist's definition of child for each particular ethnography. In one case, child was not defined (Jenness 1922); in evaluating demographic data from this ethnography I adopted Yellen's definition of a child as an unmarried individual living with his or her parents (1977:103). It would be interesting to repeat this study using a biologically consistent definition of "child" rather than a culturally relative definition, but ethnographic age data are not always reported precisely enough for this to be possible. Additionally, all roofed areas are not necessarily roofed dwelling areas in the case of the Kapauku (Pospisil 1972; this is a problem initially recognized by Leblanc [1971]). I have chosen to calculate all roofed space reported in this ethnography as dwelling area, since I lack more specific data on particular buildings within these multi-building compounds.

Percentage of children and HOD were calculated for each household in each culture. Since the Copper Inuit and Klamath data are characterized by small sample sizes, they are only analyzed qualitatively. Data from all other cultures is either non-normally distributed or of small sample size, so non-parametric statistics were employed in analysis. HOD between child and childless household groups are tested for significant difference in medians using Mann-Whitney U tests. Percentage of children per household is tested for significant correlation with HOD using Spearman's rho. A ratio, rather than absolute number of children per household, is used is used in this analysis as an attempt to make the data comparable between single-parent, polygynous, and multi- or extended-family households.

RESULTS

The Copper Inuit and Klamath datasets both qualitatively support the hypothesis that culturally relative HOD is higher when children are present. For the limited data available from these two cultures, the higher the percentage of children within a household, the higher that household's occupational density.

Mann-Whitney U tests for the Ju/'hoansi, Garo, and Dukha indicate that all groups exhibit significant differences in the median HOD between houses with (n2) and without (n1) children (Table 3, Figure 1, $p \leq 0.10$). A Mann-Whitney U could not be performed on the Kapauku data since all Kapauku households included children. Spearman correlations show that there is a significant, positive correlation between household density and percentage of children for the Ju/'hoansi, Garo, Kapauku, and Dukha (Table 4, $p \leq 0.10$).

These cultural groups practice widely different subsistence strategies and live in varied environments from the arctic to the tropics. Therefore, the hypothesis that households with children tend to be occupied at relatively higher densities than households without (or with fewer) children is supported.

CONCLUSION

Ethnographic data from six different cultural groups supports the hypothesis that the presence and quantity of children in a household is significantly related to that household's occupational density. This difference appears to hold true cross-culturally (though should be continue to be tested as ethnographic data become available). Since a higher ratio of children in a household positively correlates with higher HOD, prehistoric comparisons between households with and without children can be conducted at archaeological sites. In archaeological cases where occupation span between households is similar, it should be expected that households with children are characterized by relatively higher artifact densities than households without them.

One caveat of this analysis is that artifact density is potentially affected by many other variables besides household size, including differences in wealth, frequency of cleaning behavior, per capita discard rate, and subsistence strategy. However, patterned differences in relative artifact density between households could bolster demographic interpretations when employed as one of multiple lines of evidence to suggest the presence of juveniles (in addition to, for example, novice craft production - e.g. Bamforth and Finlay 2008). Future archaeologies of children ought to expand the types of evidence used to reconstruct prehistoric age structure of households and populations to include patterned differences in material residues commonly found at prehistoric archaeological sites, such as those produced by variations in HOD, rather than focusing on rare individual items such as toys and miniatures (e.g. Park 1998). Patterned indicators of household age structure will persist in the archaeological record longer than singular, often perishable, miniatures.

Identifying children is not only about writing them into the past as active agents within their own individually constructed worlds (Baxter 2005: 23; Baxter 2008; Derevenski 1997: 193; Lillehammer 2010; Schwartzman 2005: 123). Characterizing differences in household-level demographics is an essential and relatively underexplored topic in prehistoric archaeology that could help elucidate processes of cultural transmission and change, age-dependent subsistence strategies, reproductive fitness, population growth/pressure, reproductive constraints on mobility, or any number of other relevant subjects imperative for explaining human behavior in prehistory.

TABLES

Table 1 - Brief descriptions of each cultural group considered in this cross-cultural study, including broad environmental, subsistence, and mobility information. The table also includes a description of household types and mathematical formulas used for calculating floor area.

Culture	Geographic Area	Biome	Subsistence and Mobility	Household Type	Household Floor Area	Definition of Child[1]	Number of Households	Citation
Copper Inuit	Canadian Arctic Circle	Arctic tundra	Nomadic hunter-gatherer	Snow huts, dataset includes only monogamous, single-family households	Circular, (πr^2)	Never married, living with parents (Yellen, 1977: 103)	3	Jenness 1922:65,68-9
Klamath	High plateau of eastern Oregon	Temperate coniferous forest	Sedentary hunter-gatherer	Earth lodges, multi-family, monogamous and polygynous households	Circular (πr^2)	Pre-pubescent individuals (Spier 1930: 61)	2	Spier 1930:53-4
Garo	Northeast India	Tropical moist forest	Sedentary agriculturalistHigh plateau of eastern Oregon	Bamboo houses, single- and multi-family, monogamous and polygynous	Rectangular (L x W)*	Pre-pubescent or pubescent individuals (Burling 1963: 324)	60	Burling 1963:26,325-8
Kapauku	Western New Guinea	Tropical moist forest	Sedentary agriculturalist	Thatched plank, rattan, and reed houses; size influenced by economic status (Pospisil 1972: 258-9); mostly extended monogamous families,	Rectangular (L x W),* [2]	Thirteen or younger	14	Pospisil 1972:173, 420

Culture	Geographic Area	Biome	Subsistence and Mobility	Household Type	Household Floor Area	Definition of Child[1]	Number of Households	Citation
				several polygynous				
Ju/'hoansi	Northern Kalahari	Desert	Nomadic hunter-gatherer	Huts supported with branches, dome-shaped and thatched with grasses during the wet season; mostly monogamous nuclear families, one polygynous family, two bachelors	Circular (πr^2), semi-circular ($\pi r^2/2$), or elliptical ($\pi LW/4$)*	Never married, living with parents	60[3]	Yellen 1977
Dukha	Northern Mongolia	Alpine tundra	Nomadic pastoralist	Conical pole and canvas (traditionally birch-bark; DePriest 2010) structures called *ortz;* mostly monogamous nuclear families, one bachelor	Elliptical ($\pi LW/4$)**	Under 13[5]	10	Collected in the field (summer 2013)

[1] - Several consistency problems exist between these datasets, most notably that the definition of "child" varies between ethnographies. I chose to use each anthropologist's definition of child for his particular ethnography. In one case, child was not defined (Jenness, 1922); in evaluating demographic data from this ethnography I adopted Yellen's (1977, p. 103) definition of a child as an unmarried individual living with his or her parents.

[2] - All roofed areas are not necessarily roofed dwelling areas in the case of the Kapauku ([Pospisil, 1972]; this is a problem initially recognized by Leblanc [1971]). I have chosen to calculate all roofed

space reported in this ethnography as dwelling area, since I lack more specific data on particular buildings within these multi-building compounds.

[3] - Yellen (1977) follows the same twelve household groups and maps their associated living spaces in detail at fourteen camps, yielding 60 total household measurements; this dataset therefore includes pseudoreplication.

[4] - Number and age of household occupants recorded during interviews conducted by Todd Surovell

Table 2 - Ethnographic data from sources reported in Table 1, calculated as described in Table 1's "Household Floor Area" column.

Culture	**Camp#**	**Hut/ House#**	**# adults**	**# children**	**% children**	**Household area (m2)**	**HOD (ppl/m2)**
Klamath			4	0	0	16.417	0.24
Klamath			9	11	55	65.669	0.3
Copper Eskimo			3	2	40	7.542	0.66
Copper Eskimo			2	1	33	7.917	0.38
Copper Eskimo			2	1	33	8.829	0.34
!Kung	2	1	2	4	67	1.223	4.91
!Kung	2	2	2	3	60	1.981	2.52
!Kung	12	1	2	3	60	1.461	3.42
!Kung	12	2	2	0	0	2.102	0.95
!Kung	12	3	2	4	67	3.141	1.91
!Kung	12	4	1	0	0	1.097	0.91
!Kung	12	5	3	0	0	2.596	1.16
!Kung	13	1	2	0	0	2.596	0.77
!Kung	13	2	2	4	67	2.865	2.09
!Kung	13	3	1	0	0	1.097	0.91
!Kung	13	4	2	3	60	1.877	2.66
!Kung	13	5	3	0	0	2.345	1.28
!Kung	14	1	2	4	67	2.865	2.09
!Kung	14	2	2	3	60	1.872	2.67
!Kung	14	3	2	0	0	2.596	0.77
!Kung	14	4	2	0	0	2.102	0.95
!Kung	14	5	2	1	33	2.102	1.43
!Kung	14	6	3	0	0	2.102	1.43
!Kung	14	7	1	0	0	2.102	0.48
!Kung	15	1	2	3	60	1.298	3.85
!Kung	15	2	3	0	0	4.054	0.74
!Kung	15	3	2	4	67	4.054	1.48
!Kung	15	4	1	0	0	1.433	0.7
!Kung	15	5	2	0	0	2.596	0.77
!Kung	15	6	2	0	0	2.865	0.7
!Kung	6	1	2	3	60	1.876	2.67
!Kung	6	2	1	0	0		

!Kung	6	3	2	4	67	4.388	1.37
!Kung	7	1	2	4	67	2.962	2.03
!Kung	7	2	1	0	0	1.981	0.5
!Kung	7	3	2	3	60	4.374	1.14
!Kung	7	4	2	0	0	1.14	1.75
!Kung	7	5	3	0	0		
!Kung	7	Child's play	?	?		0.783	
!Kung	10	1	3	0	0	1.571	1.91
!Kung	10	2	1	0	0	0.939	1.06
!Kung	10	3	2	3	60	2.027	2.47
!Kung	10	4	2	4	67	2.596	2.31
!Kung	10	5	1	0	0		
!Kung	10	6	2	1	33	2.02	1.49
!Kung	10	7	2	3	60	3.739	1.34
!Kung	11	1	2	3	60	2.345	2.13
!Kung	11	2	2	1	33	2.865	1.05
!Kung	11	3	1	0	0		
!Kung	11	4	2	3	60	1.173	4.26
!Kung	11	5	3	0	0	0.83	3.61
!Kung	11	6	1	0	0	0.933	1.07
!Kung	11	7	2	4	67	3.431	1.75
!Kung	1	1	2	4	67	4.653	1.29
!Kung	1	2	2	2	50	5.503	0.73
!Kung	3	1	2	4	67	7.242	0.83
!Kung	3	2	2	3	60	4.704	1.06
!Kung	3	3	2	2	50	2.428	1.65
!Kung	3	4	2	4	67	2.027	2.96
!Kung	3	5	1	1	50	2.546	0.79
!Kung	4	1	2	4	67	2.596	2.31
!Kung	4	1	2	0	0	2.596	0.77
!Kung	4	2	1	0	0	1.172	0.85
!Kung	4	3	2	3	60	3.142	1.59
!Kung	4	4	2	4	67	3.739	1.6
!Kung	5	1	2	4	67	3.546	1.69
!Kung	5	2	2	3	60	3.341	1.5
!Kung	9	1	2	4	67	3.326	1.8
!Kung	9	2	2	3	60	2.613	1.91
!Kung	9	3	1	1	50	0.658	3.04
Garo		1	4	2	33	1050	0.006
Garo		2	2	1	33	750	0.004
Garo		3	4	2	33	450	0.013
Garo		4	3	0	0	900	0.003
Garo		5	4	0	0	1100	0.004
Garo		6	2	2	50	900	0.004
Garo		7	4	0	0	1100	0.004
Garo		8	2	2	50	900	0.004
Garo		9	5	6	55	1200	0.009
Garo		10	3	2	40	900	0.006
Garo		11	5	3	38	1200	0.007
Garo		12	2	0	0	750	0.003
Garo		13	3	4	57	900	0.008
Garo		14	3	0	0	1100	0.003
Garo		15	2	2	50	750	0.005
Garo		16	2	0	0	900	0.002

Garo		17	6	1	14	1200	0.006
Garo		18	4	3	43	1000	0.007
Garo		19	4	2	33	1200	0.005
Garo		20	2	2	50	900	0.004
Garo		21	5	3	38	1350	0.006
Garo		22	3	3	50	825	0.007
Garo		23	2	3	60	1000	0.005
Garo		24	2	0	0	450	0.004
Garo		25	3	2	40	900	0.006
Garo		26	2	0	0	300	0.007
Garo		27	2	3	60	975	0.005
Garo		28	2	1	33	500	0.006
Garo		29	2	3	60	1100	0.005
Garo		30	6	2	25	1000	0.008
Garo		31	2	2	50	900	0.004
Garo		32	4	3	43	750	0.009
Garo		33	5	3	38	1300	0.006
Garo		34	2	4	67	900	0.007
Garo		35	4	2	33	900	0.007
Garo		36	4	2	33	825	0.007
Garo		37	3	1	25	975	0.004
Garo		38	5	5	50	1500	0.007
Garo		39	5	3	38	750	0.011
Garo		40	2	0	0	600	0.003
Garo		41	2	2	50	500	0.008
Garo		42	2	2	50	825	0.005
Garo		43	4	2	33	750	0.008
Garo		44	2	0	0	750	0.003
Garo		45	4	1	20	900	0.006
Garo		46	3	1	25	300	0.013
Garo		47	3	2	40	825	0.006
Garo		48	2	0	0	600	0.003
Garo		49	4	0	0	900	0.004
Garo		50	6	1	14	550	0.013
Garo		51	3	0	0	750	0.004
Garo		52	4	0	0	600	0.007
Garo		53	3	1	25	600	0.007
Garo		54	6	0	0	1050	0.006
Garo		55	2	3	60	600	0.008
Garo		56	1	1	50	375	0.005
Garo		57	3	3	50	600	0.01
Garo		58	2	1	33	700	0.004
Garo		59	2	0	0	525	0.004
Garo		60	3	2	40	600	0.008
Kapauku		1	8	4	33	14.222	0.8
Kapauku		2	7	4	36	28.444	0.4
Kapauku		3	3	2	40	26.667	0.2
Kapauku		4	8	5	38	24.89	0.5
Kapauku		5	4	2	33	14.222	0.4
Kapauku		6	9	7	44	23.111	0.7
Kapauku		7	9	6	40	28.444	0.5
Kapauku		9	4	3	43	7.111	1
Kapauku		10	2	2	50	16	0.3
Kapauku		11	4	9	69	10.667	1.2

Kapauku		12	7	7	50	14.222	1
Kapauku		13	6	3	33	23.111	0.4
Kapauku		14	5	1	17	21.333	0.3
Kapauku		15	4	2	33	35.556	0.2
Dukha		1	6	1	14	37.369	0.187
Dukha		3	4	0	0	31.974	0.125
Dukha		4	2	3	60	25.392	0.197
Dukha		5 (2012)	3	2	40	29.704	0.168
Dukha		5 (2013)	4	1	20	31.667	0.158
Dukha		6	2	3	60	17.703	0.282
Dukha		7	2	2	50	29.61	0.135
Dukha		8	1	0	0	19.627	0.051
Dukha		9	3	2	40	29.217	0.171
Dukha		10	2	1	33	32.162	0.093

Table 3 - Mann-Whitney U tests comparing difference in medians between households with children (n2) and households without children (n1). All are significant at p≤0.10.

Group	**n1**	**n2**	**Significance**
Ju/'hoansi	22	38	<<0.01
Garo	16	44	<<0.01
Dukha	2	8	0.089

Table 4 - Spearman correlations between percentage of children and household density for each cultural group. All are significant at p≤0.10.

Group	**N**	**ρ**	**Significance**
Ju/'hoansi	60	0.577	<<0.01
Garo	60	0.382	0.003
Kapauku	14	0.509	0.063
Dukha	10	0.667	0.035

PICTURES

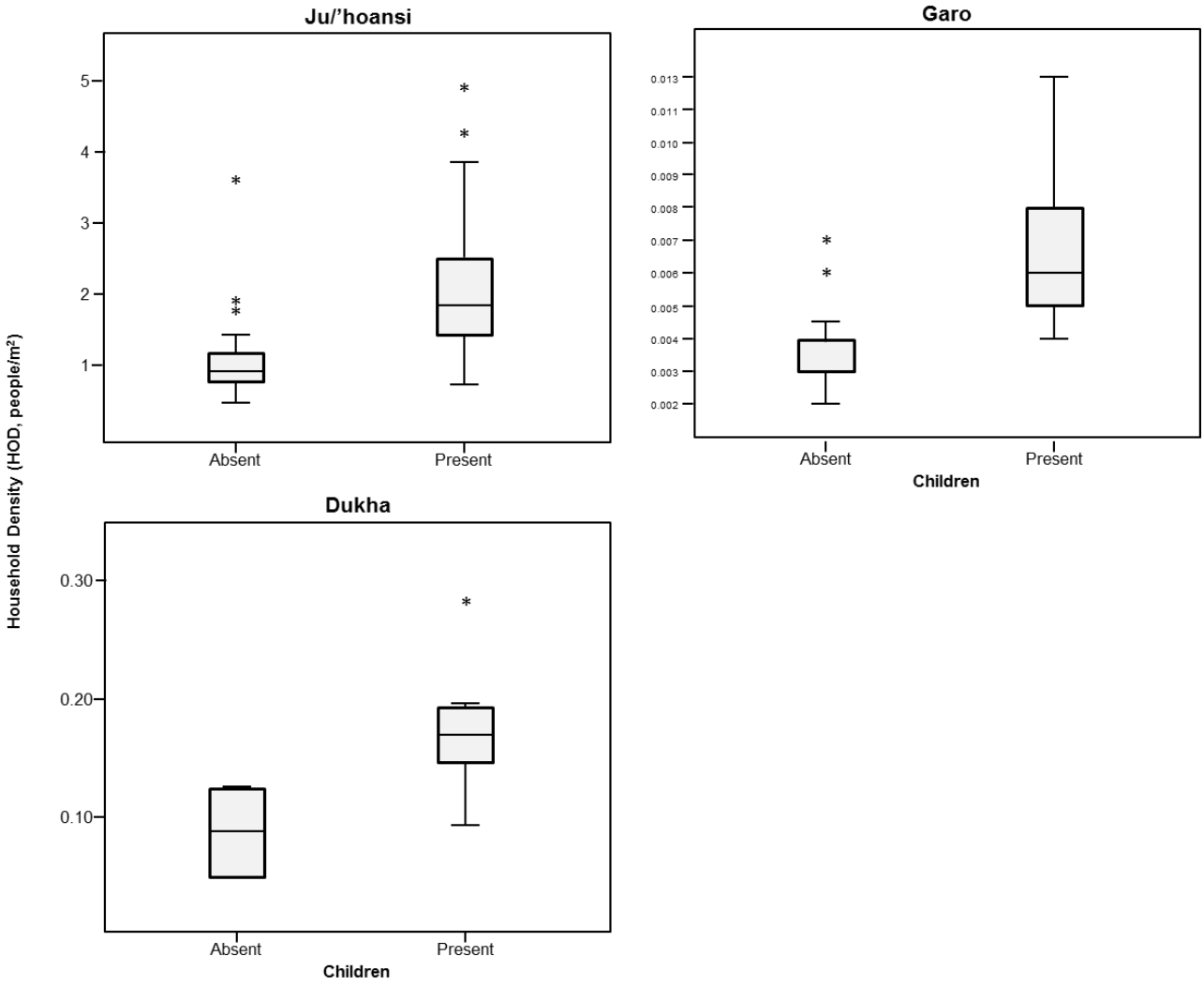

Fig. 1 - Box-and-whisker diagrams illustrating median differences in intra-household density between households with children and households without children for the a) Ju/'hoansi, b) Garo, and c) Dukha. Y-axes indicate household density in units of people per square meter. Differences in household density are statistically significant at p≤0.10 for all three cultures.

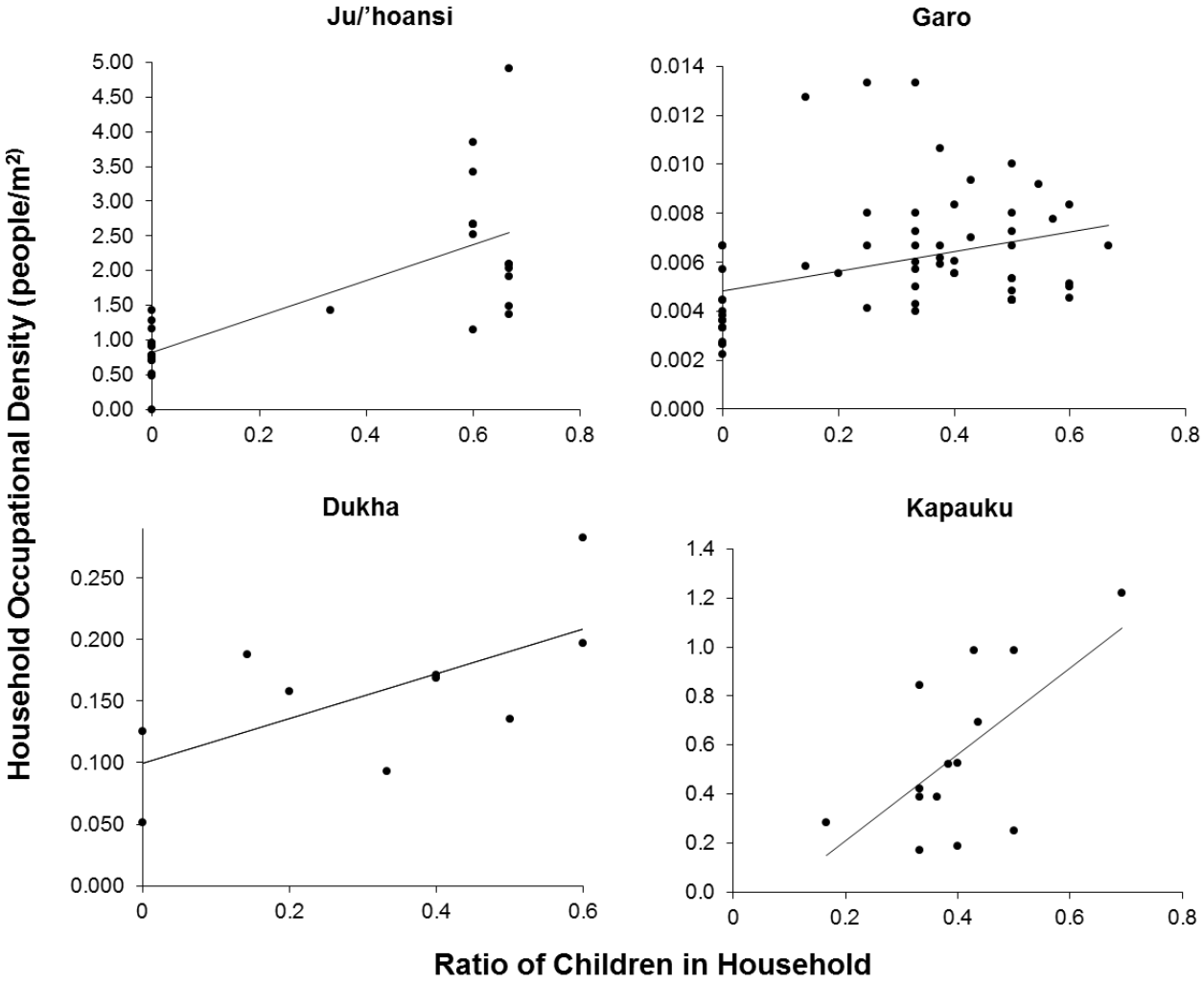

Fig. 2 - Household occupational density (y-axis) versus ratio of children in each household (x-axis) for the a) Ju/'hoansi, b) Garo, c) Dukha, d) Kapauku. In all cases, HOD significantly increases as the proportion of children in a household increases. All are significant at p≤0.10.

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