



Physical stature of adult Tsimane' Amerindians, Bolivian Amazon in the 20th century

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Abstract

We examine the association between exposure to the market and Western society on the height of adult Tsimane', a foraging-farming society in the Bolivian Amazon. As with other contemporary native peoples, we find little evidence of a significant secular change in height during 1920–1980. Female height bore a positive association with own schooling and fluency in spoken Spanish and with maternal modern human capital (schooling, writing ability, and fluency in spoken Spanish), but male heights bore no association with parental height or with modern human capital. The absence of a secular change likely reflects the persistence of traditional forms of social organization and production that protect health.

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1. Introduction

As a barometer of personal well-being, adult physical stature responds to socioeconomic upheavals produced by changes in modes of production and in forms of social organization (Bogin and Keep, 1999; Steckel and Rose, 2002; Komlos, 1994, 1998; Fogel, 2005). For instance, archaeologists have found examples in which physical stature initially declined as people shifted

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from a foraging to a more sedentary farming lifestyle (Larsen, 1995, 2002; Steckel, 2003; Steckel and Rose, 2002; Salzano, 1990). Economic historians have found that during the transition to industrialization in the nineteenth century, the physical stature of city dwellers and people of low socioeconomic status declined in Europe, Japan, and in the USA (Komlos, 1994; Haines, 2004; Arora, 2005). The decline was brief, and the long-run economic prosperity of industrial nations has produced significant increases in physical stature over the last 150 years in those nations (Bielicki, 1986; van Wieringen, 1986; Eveleth and Tanner, 1990).

Despite our increasing understanding of secular trends in physical stature over broad swaths of time and space (Prince, 1995; Bogin, 2001; Bogin and Rios, 2003; Steckel, 1995; Komlos, 1994; Haines, 2004; Dufour et al., 1994), we know little about whether the physical stature of contemporary highly autarkic native peoples changes as they enter the market economy. Past research yields equivocal guidance about what to expect.

1.1. Decline in physical stature

Anthropologists find that contemporary foragers often enjoy adequate nutrition and general health (Froment, 2001; Eaton and Eaton, 1999). Some have hypothesized that changes in lifestyle from exposure to the market economy and Western society lower the quality and the level of foods consumed by foragers, thus eroding their general health and, it would follow, their physical stature (Wirsing, 1985). Shephard and Rode draw on longitudinal information from Inuit males and females 65 years of age and find that between 1970 and 1990 males lost 2.1 cm and females lost 0.4 cm on average in physical stature (Shephard and Rode, 1996). They attribute shrinking among males to the vertebral compression associated with the use of snowmobiles, and among females to lower consumption of Vitamin D, increased reliance on a jejune diet, reduced exposure to sunlight, and to the decline in the practice of carrying children on the back, that may have reduced the likelihood of developing osteoporosis. But counterbalancing the finding from the Inuit, one finds evidence from Asia, Africa, and other parts of the New World, including the arctic (Zammit et al., 1993; Jamison, 1990), showing that exposure to the market economy bears tenuous links to physical stature. Some have questioned the notion that ‘affluent’ modern foragers consume an ideal diet (Wilmsen, 1989).

1.2. Increase in physical stature

Leonard et al. (1996) estimated secular trends in physical stature for a period covering 90 years for a sample of 241 female and 273 male herders in Siberia. After correcting for the loss of physical stature from aging, they found that average adult physical stature had increased by 1.6 cm/decade among males, and that it had remained constant among females. They found that males 18–29 years of age were seven cm taller than males over 50 years of age, and six cm taller than their age peers from the late nineteenth century. Nicholas et al. (1998) estimated secular trends (1890–1955) in physical stature among indigenous peoples in Australia and found an improvement among females and no change among males. In contrast, Barrett and Brown (1971) found an increase in physical stature during the twentieth century among Australian aborigines of the Northern Territories.

In the Nuñoa district of the southern Peruvian highlands, researchers (Leatherman et al., 1995; Carey, 1990) found that adolescent boys and girls measured in the 1980s were much taller than their counterparts of the 1960s. In Nuñoa Leonard et al. (Leonard, 1989; Leonard et al., 1990) found that among children of the 1980s, there was evidence of secular trends in growth of

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