Are children whose mothers have access to grandparental help during pregnancy born bigger and healthier? Grandparents can be important sources of assistance during the prenatal and perinatal period, for example by providing additional food to the expectant mother, helping her travel to the clinic for antenatal care, relieving her of some of her work, monitoring the pregnancy for complications, and helping in delivery emergencies. This support can improve maternal health and nutrition and therefore also affecting prenatal growth.

While several papers have examined the effect of grandparental presence on child health, they have not looked for evidence of grandparental effects prior to birth. This paper studies the possible benefits of grandparents for health at birth using a demographic surveillance survey from rural KwaZulu-Natal, South Africa. I assess child health at birth in terms of birthweight and Apgar score at one minute after birth. Birth weight is largely the result of nutrition and maternal health throughout the pregnancy. Birthweight is therefore taken largely as a measure of long-term fetal development. Apgar score is a 10-point scale of vital signs at birth and is used to identify babies at risk of complications. It is thus primarily a measure of the stress surrounding the birth and of the success of emergency assistance.

The study area and data used provide an excellent setting for this research. The structure of the data makes it possible to explore the links between household composition and child wellbeing better than has usually been the case because it captures detailed information about most relatives, including those living outside the household and even those who spend time away from the study area.

The study area is a community with changing household dynamics. Fertility is falling, marriage is no longer the norm, migration is common, and AIDS is widespread. About 75% of infants in this population live in a household headed by somebody other than their parents, including 50% living in a grandparents' household. Nationally, one third of black children under 5 lived with a person over 65 in 2000 (Duflo 2000). As is emergent in this and other studies, children living with grandparents tend to be disadvantaged because they are often orphans, children of unmarried parents, or children of young mothers. Understanding the impact that grandparents have on child health at all stages is relevant to understanding household coping mechanisms and the consequences of the changing family structures which have been observed here and elsewhere and can provide clues about the best way to channel interventions.

BACKGROUND

Both theoretical and empirical reasons have been proposed for expecting grandparents to benefit child welfare. On the basis of evolutionary theory, relatives are vested in each others' survival because genetic fitness is expressed through the survival of related children. Some have even argued that a grandmother effect may be at the root of human post-reproductive survival, in that those families where the grandmother survives to assist her daughters in their childbearing endeavors are more likely to have children survive and so have an evolutionary advantage (Kaplan 1997).

There is some evidence of grandparental effects from the social sciences. Using a South African survey, Duflo (2000) sought to determine whether grandparents use their pensions to help their grandchildren. She found that the pensions of grandmothers but not those of grandfathers had a significant effect on child health. However, only granddaughters experienced significant increases in weight and height related to grandmothers' pensions, while no effect was found for boys. Voland and Beise's 2002 study of child survival in historical Germany found that children aged 6 to 12 months had 1.8 times higher risk of dying if the maternal grandmother was deceased at the time of birth. However, they find that a living *paternal* grandmother doubles the risk of neonatal death and hypothesize that this is the result of excess stress placed on the mother by her mother-in-law. A study from urban Uganda reports that the more closely the child is related to the household head the higher its chances of survival (Bishai et al 2003).

Based on threads of research from biology, anthropology, economics, and socio-demography, several themes emerge with respect to household structure and child wellbeing. Many relatives, and especially grandparents, are involved in caring for a child. The identity and characteristics of the relatives, especially gender but also age and competing demands, affect the amount of resources they will allocate to the child. The identity of the child matters as well, especially gender and age. Third, the child's relationship to the relative matters, especially their gender and whether they are close relatives. Finally, the context matters, with poor households having more difficulties in protecting themselves as a unit against negative shocks.

DATA AND METHODS

The study population comprises part of the Hlabisa district of KwaZulu-Natal, South Africa, a rural area with about 100,000 individuals who are members of over 11,000 households. The key subjects are the 4,752 live births that took place in the study area in 2000 and 2001. For each live birth, I identify information about the child, the mother and the grandparents, including the circumstances of the birth, the age, marital status and subsequent survival of the mother, and the survival, age, and proximity of the grandparents. Because this is a census of everyone who is a member or a resident in the area, detailed information is available on most related individuals. If a child's grandmother is not living in the household, she can still be identified if she is a member or resident of any household in the study area.

I use two outcome variables, the child's weight at birth and Apgar score at one minute and use ordinary least squares (OLS) regressions with birthweight and Apgar score as continuous dependent variables:

$$Birthweight = b_0 + b_1 x_i + b_2 w_g + b_3 y_p + e \qquad (1)$$

$$Apgar = b_0 + b_1 x_i + b_2 w_g + b_3 y_p + e \qquad (2)$$

where x_g is a dummy variable with three possible categories: 1) grandparent is deceased (omitted); 2) grandparent is alive but not living in the same compound or household; 3)

grandparent is living in the compound into which the child was born but in a different household, and 4) grandparent is living in the household into which the child was born. W_i is a vector of child characteristics at birth, and y_p is a vector of variables specifying characteristics of the mother. Some specifications include interaction terms between maternal and grandparent characteristics. Separate regressions are run for each of a child's four grandparents.

PRELIMINARY RESULTS

The survival of grandmothers and grandfathers is positively associated with child size and health at birth. For example, children whose maternal grandmother is alive at the time of their birth are about 50 grams heavier at birth than those whose grandmothers are deceased. Children born into a compound where a grandparent lives bunt in a different household are healthier at birth. The presence of grandparents in the same household is a more complicated factor in child health. Children born into a household where a maternal grandmother or grandfather also resides are about 10 grams smaller and tend to have lower Apgar scores, though not significantly so. Children born into a household where paternal grandparents also reside weigh about 100 grams more at birth than children who do not. There are a few possible explanations for these ambiguous grandparental effects. Since Zulu children belong to their fathers' families, it may be that paternal grandparents are more likely to invest in children than maternal ones. Another explanation is that mothers who live with their parents are poorer or sicker than those who move in with a husband's or spouse's family. Indeed bridewealth is expensive and poorer families cannot undertake marriage. Importantly, being in the same household as a maternal grandparent is extremely beneficial for children whose mothers are ill. For example, children whose mothers die within a year of their birth are about 350 grams heavier and have Apgar scores almost half a point higher than children whose mothers die shortly after birth but who do not co-reside with the grandmother.

REFERENCES

Bishai, D., E.D. Suliman, H. Brahmbhatt, F. Wabwire-Mangen, G. Kigozi, N. Sewankambo, D. Serwadda, M. Wawer, and R. Gray. 2003. "Does biological relatedness affect survival?" *Demographic Research* 8(9):262-277.

Duflo, E. 2000. "Grandmothers and Grandfathers: Old Age Pension and Intra-Household Allocation in South Africa."

Gribble, J.N. 1993. "Birth Intervals, Gestational Age, and Low Birth Weight: Are the Relationships Confounded?" *Population Studies* 47:133-146.

Kaplan, H. 1997. "The evolution of the human life course." Pp. 175-211 in *Between Zeus and the Salmon: The Biodemography of Longevity*, edited by K.W. Wachther and C.E. Finch. Washington, DC: National Academy Press.

Sornes, T. 1998. "Umbilical cord encirclements and Apgar scores." *Acta Obstetricia et Gynecologica Scandinavia* 77:313-316.

Voland, E. and J. Beise. 2002. "Opposite effects of maternal and paternal grandmothers on infant survival in historical Krummhorn." *Max-Planck-Institut fur demografische Forschung Working Papers* 2001(026).