# EFFECT OF INCOME ON FETAL BIOMETRY BY ULTRASOUND

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## ABSTRACT

**Objective :** To compare gestational age corrected fetal biometry among rich and poor women.

**Methods :** An ultrasound database from August 2000 to January 2001 was used for the purpose of this study. One hundred seventy five patients with certain menstrual history were included. Patient's income was assigned based on their report during the initial evaluation. There were 137 rich and 38 poor women. All data were entered into statistix 7.0 statistical package and analysed using appropriate statistical tests. Probability values less than 5% were considered significant.

**Results :** Multiple regression analysis using a 2nd-order model for gestational age as a function of fetal biometry, income, and fetal biometry-interaction did not show income to alter the relationship between gestational age and fetal biometry except for lengths. Ninety-five percent prediction intervals for gestational age did not show clinically significant difference between rich and poor.

**Conclusion :** We have shown that fetal biometry is similar in rich and poor mothers, except the femur length which is a bit less than expected in the poor group. These differences are small, yet the may influence the outcome of antenatal care. Further study is necessary to determine the significance of income on fetal biometry.*

**Key words :** Fetal biometry, ultrasound.

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## INTRODUCTION

Fetal growth is influenced by many factors e.g. race, nutrition, antenatal care etc.[1,2] Effect of parent's income may also have some role, but we do not know about any report in this regard.

In a fetal structural survey at 15 to 20 weeks' gestation, the fetuses of Asian women had

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less-than-expected femur lengths (--0.66 ± 1.64 mm) and the fetuses of black women had greater-than-expected femur lengths (0.88 ± 1.57 mm) than the fetuses of white women in the second trimester.[1] The average length of the femur may even differ among various Asian sub-populations.[3] Parker and colleagues showed that the crown-rump length (CRL) and biparietal diameter (BPD) are similar for Asian and white fetuses up to 20 weeks. Lai and Yeo demonstrated slightly smaller BPD, head circumference, abdominal circumference and femur length (FL), more pronounced over the course of gestation, in Asian compared with white fetuses.[5] Fukada and colleagues showed that 7 of 549 fetuses (1.3%) of Japanese women had femur and humerus lengths that varied more than 1.5 SD from a growth curve determined from their study population, which had no abnormalities.[6] We sought to determine whether the fetal biometry varied with respect to income when evaluating mothers who are rich or poor.

## MATERIAL AND METHODS

All women with certain menstrual history who had fetal structural surveys between 5 and 41 weeks' gestation during August/2000 to January/2001 were included in the study. Prospectively, maternal income was documented at the time of ultrasonographic examination and standard biometric data were routinely obtained. The fetal abdominal circumference was not obtained in all patients and therefore, could not be included in this study. All scans were done in accordance with the minimum standards of American Institute of Ultrasound in Medicine (AIUM) guidelines.[7]

Gravidas were divided into groups by maternal income: rich and poor (paying and non-paying).

All ultrasonographic examinations were performed transabdominally using 3.5 MHz linear/sector transducer with Siemens Sonoline SL2 ultrasonography system (Germany).

## RESULTS

The study groups were composed of 137 rich and 38 poor mothers scanned during the study period. The mean values of the variance from the expected fetal femur length by biparietal diameter ± 1 SD for the various income groups were as follows: fetuses of poor mothers, --4.09 ± 1.11 mm; fetuses of rich mothers, 0.51 ± 1.51 mm ($P = .026$). Multiple regression analysis using a 2nd-order model for gestational age as a function of fetal biometry, income, and fetal biometry -income interaction did not show income to alter the relationship between gestational age and fetal biometry except for femur lengths. Ninety-five percent prediction intervals for gestational age did not show clinically significant difference between rich and poor.

## DISCUSSION

We have shown that the fetuses of poor women gave less than expected femur lengths than the fetuses of rich women. Our population was a consecutive group of women who had fetal structural surveys at 5 to 41 weeks' gestation. None of the fetuses in our study had physical abnormalities or syndromes that would otherwise explain

our findings. A few limitations of this study deserve mention. It had been shown that the fetal femur length can be underestimated by obtaining oblique images of the femur or overestimated by including the non-ossified portions of the femur.[8] We do not think that there was a systematic bias with regard to measuring the femur length, because we included only the ossified portion of the femur shaft, and all the measurements were done in the same way on all patients. Second, the potential for bias can be increased by some patients' tendency to hide actual income. When we collected the data for this study, we assured the patients that their income will not be reported to the tax authority by us. The Hadlock weight estimating procedure, based on abdominal circumference (AC), head circumference (HC) and femur diaphysis length (FDL) is reported to be accurate, but data on the operating characteristics are scarce.[9] Both AC and estimated fetal weight (EFW) are better suited to confirm than to detect, exclude or predict intrauterine growth retardation (IUGR). Small AC and EFW may have greatest usefulness only when IUGR is clinically suspected.[10]

## CONCLUSION

We have shown that fetal biometry is similar in rich and poor mothers, except the femur length which is a bit less than expected in the poor groups. These differences are small, yet they may influence the outcome of antenatal care. Further study is necessary to determine the significance of income on fetal biometry.

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