recruits which showed a similar excess of recorded acute respiratory illness in smokers in a proven A/H_1N_1 influenza outbreak with a similar trend toward increased severity (in preparation). Other reports of an excess influenza morbidity or seroconversion in smokers[7-9] support this finding.

We consider that our data add to the growing body of evidence implicating smoking in young people as an important contributor to acute illness (in addition to the well documented chronic effects) and that even relatively "light" smoking carries a health burden.

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Skin Color and Education Effects on Blood Pressure

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Abstract: This study reports that education effects but not skin color effects were associated with blood pressure and the incidence of hypertension in a cohort of Black females in Charleston, South Carolina, observed over the period 1960-1975. The authors suggest that skin color may be a secondary (non-causal) associate of blood pressure in Blacks. (*Am J Public Health* 1981; 71:532-534.)

Studies trying to elucidate causes of hypertension among Blacks have used the typical epidemiologic strategy of narrowing the focus from broad population groups to specific sub-groups and cultures. Initially, racial differences were identified showing Blacks with a markedly higher prevalence of hypertension than whites [1-3]; skin color has been considered as a possible genetic marker of hypertension.[4-6] More recently, we presented evidence among Black males that skin color effects on the incidence of hypertension were minimal when estimates of socioeconomic status (SES) were considered.[1] We here present further evidence of a similar nature in a population of Black females in Charleston, South Carolina.

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Materials and Methods

The study group was a random sampling of 455 Black females age 35 or older, in 1960. Seventy per cent of the survivors of this sampling were revisited in 1974 and 1975. Complete information on the original sampling has been published previously.[1] Baseline skin pigmentation estimates by light reflectance was measured at the medial aspect of the inner surface of the upper arm, a body area normally shielded from direct sunlight, yet accessible for measurement. The Photoelectric Reflection Meter, Model 610,* using an amber (tristimulus) filter, was used to make all measurements. A scale of 0 to 45 was used: the higher the number, the more reflectance from skin of lighter color (a lightly suntanned Caucasian would have a reflectance value of 40-

*Photovolt Corporation (NYC).

TABLE 1—Age Adjusted Average Blood Pressure by Education and Skin Color

	Skin Color	Education		
		Lo (≤7 yrs)	Hi (≥8 yrs)	Total
Systolic BP	Dark (≤15)*	157.1 (N = 75)	153.3 (N = 40)	155.9 (115)
	Light (≥16)*	160.8 (N = 64)	149.6 (N = 47)	155.9 (111)
	Total	158.8 (N = 139)	151.3 (N = 87)	155.9 (226)
Diastolic BP	Dark (≤15)*	91.1	89.3	90.5
	Light (≥16)*	93.8	88.4	91.5
	Total	92.3	88.9	90.9

*Skin Pigmentation by Light Reflectance

45). Skin color was approximately normally distributed but with a positive skewness. The median value was 16 and thus dichotomized as dark (≤ 15 reflective units) and light (≥ 16 units). In this study, the only measure of SES used was educational level since relatively few Black females worked outside the home in 1960. Education was considered as low (0–7 years) and high (8 years and higher) levels. Skin color and education were slightly positively correlated ($r = .185$, $p < .01$).

Results

Average blood pressure (the average of the 1960 and 1974/1975 measurements adjusted for exact interval between examination time and age) were significantly elevated in those individuals with less education. As shown in Table 1, systolic blood pressure (SBP) averaged 7 mm Hg and diastolic blood pressure (DBP) 3.5 mm higher in the lower educational class. For the group as a whole, there were no significant skin color effects, but in those with less education, SBP and DBP were slightly higher in those with light skin color. Conversely, in those with higher educational levels, blood pressures were slightly higher in those respondents with darker skin.

Analysis of variances (ANOVA) results shown in Table 2 confirms the statistical significance of the educational effects on blood pressure when controlling for skin color and age.

There were no significant differences in the incidence of hypertension rates by different levels of skin color or education, when incident cases were defined either by hypertension levels on examination or by also including those who were on anti-hypertensive medication in 1974/1975 but not at the beginning of the study in 1960. Because of the high prevalence of hypertension among Black females in 1960, only 71 (who also survived until 1974/1975) met the normotension criteria of ≤ 139 mm Hg systolic and ≤ 84 mm Hg diastolic. Thus, results of such an analysis may be biased by the initial prevalence of hypertension and its excessive mortality, and by the revisit response rate.

Stepwise multiple regression analyses of models including Quetelet (weight-height) index, weight change, education, and skin color accounted for only 5 to 6 per cent of the variability in SBP and DBP after controlling for age. The regression coefficient for skin color was not significantly different from zero in the SBP equation; for DBP it was significant but with a negative coefficient.

Discussion

These data reinforce our previous findings[7] in males, pointing to environmental influences (social class or education) on blood pressure rather than skin color effect.

In Black females in Charleston, SC, skin color did not have a direct influence on blood pressure, while educational effects were significant statistically. However, because of slight correlation between skin color and education ($r = .185$), absolute control of these variables was not possible in

TABLE 2—Statistical Evaluation of Education and Skin Color Effects

	Systolic BP Effects	From ANOVA		Diastolic BP Effects	From ANOVA	
		F	P		F	P
Education Main Effects	7.5	4.93	<.03	3.4	4.72	p < .03
Within Dark Skin	3.8	.75	ns	1.8	.76	ns
Within Light Skin	11.2	6.79	<.01	5.4	7.12	<.01
Skin Color Main Effects	0	0	ns	−1.0	0.52	ns
Within Low Education	−3.7	.94	ns	−2.7	2.27	ns
Within High Education	3.7	.59	ns	.9	.16	ns
Interaction of Education and Skin Color	7.4	1.42	ns	3.60	1.53	ns

ns = not significant

our categorical analysis. In Table 1 interaction between education and skin color is demonstrated but the skin color effects are in different directions depending on the category of education. In respondents with darker skin, blood pressure is lower in those with darker skin, but higher in subjects of higher education. Although these differences are not significant, the effect noted in females of less education, most of whom were housewives, could be construed as evidence against an hypothesis of darker skin being related to blood pressure. In an earlier paper,[7] in which a significant skin color effects on diastolic blood pressure in Black males was noted, the sample studied was a specially recruited high social class cohort. For high social class Blacks, most of whom were of light skin color, being darker may indeed have provided a stressor for elevated blood pressure. As we noted then, any skin color effect could be a non-biochemical/genetic skin color effect operating through social class.

Using "average blood pressure" as a response variable, considers the change over time, and gives a better estimate of the individual's blood pressure during the period (1960-1974/1975) than a single measurement. In another sense, it provides an estimate of change over time without requiring specific numerical bounds for normotension and hypertension and is an extension of Oldham's thesis[8] first presented in 1962.

Harburg has presented convincing data showing a positive relationship between skin color and blood pressure independent of several other factors.[6] Boyle had similar findings,[4] but all of these studies were cross sectional in nature and did not address the issue of an evolving change in blood pressure. Harburg's measurement of skin color used a restricted ordinal scale.[1-4] The validity of the ranking was governed by a nurse-observer's perception of darkness or lightness and the point of measurement (between the eyes) in an area commonly exposed to sunlight and its darkening effect. It is possible that persons of lowest SES have outside jobs that subject them to the greatest amount of sunlight and thus darkening. There is a biochemical framework for a relationship between skin color (melanin), the catecholamines, and blood pressure,[9] although the relationships between the catecholamines and blood pressure (a very logical sequence) is equivocal.

Skin color is without doubt a heritable characteristic, but it is not necessarily a genetic marker that equates with health or illness. We suggest that when skin color effects are present, they may be the equivalent of a secondary (non-causal) association.

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Rural Health Care Conference Scheduled For May

A conference on rural health care will be offered to health professionals throughout the Southeast May 18–19, 1981 at the University of North Carolina at Chapel Hill. The conference is sponsored by the Department of Health Education of the UNC School of Public Health and by the Health Assurance Section of the Division of Health Services of the North Carolina Department of Human Resources.

Entitled "Serving Underserved Communities: Survival Strategies for Rural Health Care in the 1980s", the conference is designed for health planners, administrators, and providers concerned with rural health care. Topics to be examined include: strategies to improve the delivery of rural health care through community participation and outreach; the potential of self-help and self-care in meeting health needs; community and social diagnosis and needs assessment; enhancing community involvement in program planning development and evaluation; and securing program funding and support.

A $55 registration fee will cover the cost of all program materials. Application has been made for Continuing Education Units (CEUs) through the UNC-CH School of Public Health.

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