of government with one hand, and trying to justify the professional decisions of individual members with the other. Yes, we should cooperate as necessary to see that qualified members serve in a peer review organization or that our peer review committees perform services for such an organization, but this Society should not, in my belief, either be, or be responsible for, that organization.

Health Maintenance Organizations, whether of the Kaiser-Permanente or the Medical Foundation type, require a large patient group and much administrative organization to be efficient. Ours is still a rural state, and we must plead that any guidelines for such organizations allow flexibility and some experimentation without penalty. We, too, wish to see care made available for those who need it, but plans to provide it will have to be worked out in different ways in different areas.

We all know that even now 35% of the money spent on health care in this country comes from the federal government, and indications are that the proportion will be much more. The only way we as individuals and as a Society can have any influence on the manner in which this is spent—on the guidelines for peer review, HMO's, and all the rest—is through our congressmen and senators. It follows, therefore, that we in this state just as others in their states must make our ideas and opinions and problems known in Congress. We are fortunate in North Carolina in having Congressmen who know us and respect us and will try to help us. One reason they do is the superb work of Dr. Beddingfield and his committee, but equally important, if not more so, has been the work of MEDPAC—an organization (in which Dr. Beddingfield is equally active) that has supported these men as candidates, kept in contact with them, and helped them in other ways in Washington. MEDPAC deserves the support of every member, not only with our contributions, but also with our time and efforts. Surely the cost of a non-tax-deductible membership is not too much to invest in having friends in Congress. I urge you to attend the MEDPAC banquet tomorrow night, whether you are a member or not; and if you are registered here at the hotel, it will cost you nothing.

Communication

I shall finish where I began, speaking of communications. Throughout the year we have tried to keep you informed via the *Public Relations Bulletin*, the *President's Newsletter*, and the organization section of the *North Carolina Medical Journal*. Minutes of committee meetings have been published in detail, and special effort has been made to inform the entire membership as far in advance as possible of matters to come before this House, so that you and the members you represent might have the opportunity to discuss them prior to this meeting. I hope that our efforts have not been buried in your stack of unread journals or thrown out with your junk mail. Rather I hope that you felt informed before you came, that on your return home you will report the actions of this House to your county membership, and that you will encourage serious discussion during the coming year about matters on which we still must make decisions.

Faithful readers of the President's Newsletter will know that in it I have already documented much of the activities of the past year. I have tried to be brief, factual, and impartial. To some extent I must have succeeded, for all doctors west of Raleigh seem to believe that I favor a two-year medical school at East Carolina University and all east of Raleigh seem to believe that I am opposed. Lest you ask me now, even as a news reporter did, what my personal opinion is, I shall hasten to add that I have made no public statement of my opinion, nor do I intend to do so at the moment.

But since both points of view will come before you in resolutions, I would like to impress upon you these thoughts before you become embroiled in any heated discussions about the matter. This Society is already on record as favoring the liberal use of state money to educate doctors within the state, both in public and private institutions. Furthermore, we have encouraged the existing schools to increase their enrollment of North Carolina students and to expose them to training for the rendering of medical care in community settings. In this current matter, therefore, as I see it, we can serve no useful purpose by making any new public statement of policy that would in any way weaken our earlier position with which we all seem to agree.

Conclusion

In closing, how does one adequately pay tribute to a dedicated staff and some six hundred loyal members who have worked diligently without praise, compensation, or adequate public recognition in carrying on the work of the Society during the past year? To each of them, be he officer, councilor, commissioner, committeeman, or staff, may I express my thanks and yours for his commitment of time and energies to serve us all. And to all of you, my thanks for your confidence and support and for the privilege and honor of having had the opportunity to serve as your President.

Seven Years Of North Carolina Perinatal Mortality Rates

HERBERT E. BILL, M.D.

With the January, 1969 issue of the *North Carolina Medical Journal* was initiated the program of regular monthly reporting of the perinatal mortality rates for each of the state's 100 counties and of individual cities with population of 10,000 and more. The project was sponsored by the Maternal Health Committee of the State Medical Society and the North Carolina Obstetrical and Gynecological Society. The data were prepared by the State Department of Health.

This article was intended to review and summarize the first full year of operation of that program. It became apparent that the value of the monthly figures could not be adequately realized except in the perspective of past experience. Analysis of the statistics for the past seven years was therefore undertaken.

That study, of which the accompanying tables are in essence a synopsis, clearly demonstrates that the monitoring of perinatal mortality rates for counties and cities can be meaningful. The differences between low rates and high rates and the changes in some others were often of such magnitude and persistence as to suggest also that many physicians could not have been aware of the relative standing of their communities over this period of time.

The original purpose of the program, it will be recalled, was to supply local physicians with unbiased statistical information for their own evaluation and interpretation. In line with that original purpose, the more specific objectives of this present study were to prepare tables and lists that would facilitate comparison of various important facets of the local obstetric records; to describe the data which those tables and lists cover and the format of their presentation; to discuss and illustrate the significance of some of the factors that should or should not be considered in evaluation and interpretation; and to document the usefulness of the monthly perinatal mortality figures to practicing obstetricians and local physicians in general.

In another part of the review the accumulated data of the first 15 reports, beginning with that which referred to the year ending with October, 1968, were used to study the fluctuations which actually took place among those published rates. The compiled infor-

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mation assists in the evaluation of the significance of the monthly changes. It demonstrates for series of different sizes how large would be the maximum span, over the 15-month period, between the lowest and highest rates, which would include the largest 5 or 10 per cent of those differences. Furthermore, it distinguishes, with considerable reliability, the deviations from month to month which only 10% of such future rates could be expected to exceed. Those would be spans and rates that call for particular consideration.

The paper closes with several generalizations drawn from or supported by the statistics.

Features of the Program

For those who may not be familiar with the program itself and with the data published monthly, several features should be described initially.

Race specific rates

In the monthly tables and those presented here, births, deaths, and perinatal mortality rates for white and nonwhite populations are reported separately. Because of the usually marked differences between the statistics for the different races, the publication of total rates that include births of all races together, while avoiding the appearance of segregation, would simply reflect the racial mix of a particular county or city to such a degree that any effort at comparison would be all but meaningless.

"Twelve-month running means"

The monthly numbers of separate white and nonwhite births in many counties and cities are so small that fluctuations in the perinatal mortality rates for single months would also have made them meaningless.

Each monthly report, therefore, covers the obstetric experiences of 12 consecutive months. Officially known as the "12-month running mean," each successive rate includes the experience of the next most recent month and drops that of the then thirteenth preceeding month.

Thus the data under review commence with perinatal deaths among babies born in October of 1967, and cover the experience of the entire two-year period of 1968-1969.

Partial exclusion of small series

Because also of the potential magnitude of the fluctuations due to the effect of chance alone, no rates were calculated on the monthly tables for counties and cities having less than 101 race specific births or fewer than four deaths in the 12-month reporting period. For this review, so as not to selectively exclude counties and cities with very low mortality, the rates were calculated for all localities with 101 or more annual race specific births regardless of the number of deaths.

Three-month time lag

The 12-month period covered by each monthly report ends three months before the month of publication. This allows time for nearly all of the vital statistics certificates of the reporting period to have been received by the Statistics Section of the State Health Department in Raleigh. In following the trends which the monthly reports may indicate, there is always a three-month time lag which in no way affects validity.

The figures for December of 1968 and 1969, for instance, were reported in the March issue of the **Journal** of the next respective years.

Provisional nature of the statistics for 1968-1969

A warning ought to be given at this point that those December figures which include all of the deliveries for 1968 and 1969 will differ somewhat from the ones issued by the State Health Department in its official annual publications of "Vital Statistics." Instead of the three-month cut-off point for the rates published by the **Journal,** the State Health Department allows six months for receipt of the certificates of the preceeding year. Reporting of some out-of-state births may take that long.

Definition of perinatal mortality

The perinatal mortality rates used here cover all pregnancies with at least 20 weeks gestation and include intrauterine deaths or stillbirths from that point on and neonatal deaths occurring under 29 days of life. They are presented as rates per thousand total deliveries. The latter include both live and stillbirths.

The Record of the State as a Whole in 1969

The "12-month running means" for the state as a whole are summarized in Table 1 because of the measure which they give of the magnitude of the perinatal mortality problem of the present time.

The decline in white perinatal mortality rates (Table 1) from the end of the 12-month period terminating Dec. 31, 1968 through the year 1969 represents a reduction of almost 3.8% of the earlier rate. For nonwhite births the corresponding reduction was a little over 5.5%.

Table 1

Consecutive Monthly "Twelve Month Running Means" For Perinatal Mortality in North Carolina As a Whole During 1969

	Dec. 1968	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
White	29.1	29.0	28.9	28.6	28.5	28.7	28.6	28.5	28.1	27.9	27.6	27.9	28.0
Nonwhite	49.9	50.1	50.2	50.4	50.0	50.2	50.7	50.4	48.5	48.5	48.3	47.7	47.2

It may turn out that North Carolina simply shared a nationwide reduction in perinatal loss. The national figures for 1969 are not available. Infant mortality is not the same thing but it does include neonatal deaths, for which the provisional national estimate has been officially released.[1] A 4.6% reduction in the national infant mortality rate for 1969 was predicted.

Actually the latest national rates for fetal and neonatal deaths from the Center for Health Statistics are those for 1967.[2] The figures for the North Carolina neonatal death rates are slightly above those presented by the State Board of Health. Such a discrepancy is frequent, and is usually explained as the result of differing cut-off dates and more complete recording of out-of-state deaths of North Carolina residents.

The race specific rates show North Carolina in a less unfavorable light (Table 2).

Table 2

Total and Race Specific Fetal and Neonatal Mortality Rates Per Thousand: 1967[1]

North Carolina Ranking In Ascending Order Of Rates Among 51 Areas (50 States and District of Columbia)

	National HEW Reports United States	North Carolina		North Carolina Board of Health
Fetal death	Rates	Rates	Rank	Rates
White	13.5	13.5	33	13.5
Nonwhite	25.8	27.1	37	27.1
Total	15.6	17.7	42	
Neonatal death				
Total	16.5	18.2	45	
White	15.0	15.3	25	155.2
Nonwhite	23.8	25.1	40	24.9

Data from National Center for Health Statistics.

The significance of the small differences existing among most states is indicated by the fact that North Carolina lost only three more babies neonatally per 10,000 white births than did the nation at large. The white stillbirth rates were identical. For the nonwhite populations the similar figures are 1.3 more stillbirths per thousand and 1.3 more neonatal deaths per thousand than the national average.

The salvage of North Carolina babies represented by the 1969 reductions implies the added survival of one baby out of every 910 white births, and one out of every 370 nonwhite births. In the state as a whole, from another point of view, the annual salvage in 1969 amounted to 74 living white babies and 76 living nonwhite babies that would otherwise have been lost:

$$\frac{1.1 \times 67407}{1{,}000} = 74 \qquad \frac{2.7 \times 28091}{1{,}000} = 76$$

Small as this salvage seems, it will become more difficult to achieve as time goes by. The year 1969, for instance, marked the seventh time since 1942 when the annual nonwhite perinatal mortailty rate for the entire state dropped as much as 5% of the rate for the preceeding year.[3] The overall reduction since 1942, however, had been from 73 per thousand to less than 50 per thousand.

Some of this salvage, incidentally, no doubt represents the effects of chance alone. When one considers that part of the fluctuation may be seasonal, it becomes plain that the maximum deviations of 1.5 per thousand for white rates and 3.5 per thousand for nonwhite rates do not leave much room for variation due to chance alone in a series of this size.

The Data to be Displayed

There follows a brief description of the

tables which are the essence of this article and of the information which they present.

Order of listing

In all the major tables (A-E) the counties and cities are commonly arrayed in ascending or descending order of the magnitude of their provisional perinatal mortality rates for the period 1968-1969. When two or more localities share the same rate they are listed alphabetically.

Individual county and city rates for 1968-1969

Base lines were needed for the study of monthly fluctuations, but the figures of no single monthly report could be taken as measurements of the perinatal losses over the entire period covered by the year's published statistics.

Averages calculated for the monthly "12-month running means" cover deliveries from January 1, 1968 through December 31, 1969 and constitute provisional perinatal loss ratios for the complete two-year period. In the hope of avoiding confusion, the text often refers to those figures as "rates" for 1968-1969. Strictly speaking, they should always be called "ratios."

Those provisional ratios are adequately comparable measurements of the obstetric experience of those two years. While in no way free of it, those averages, derived from rates for overlapping periods of time—the "12-month running means"—have the incidental advantage of being less subject to the influence of chance than would the rates calculated directly from the total numbers of births and deaths for the period.

In a separate study, the values for twice the Standard Deviations* were computed for the provisional white ratios of 104 localities and for the nonwhite ratios of 86, based on the total numbers of births reported for June of 1969—the mid-period. It would generally be accepted that the variations in such rates due to chance alone, which would be greater or less than the ratios themselves plus or minus the values for twice their standard deviations, would occur about 5% of the time: 5% of 1,248 white rates = 62; 5% of 1,032 nonwhite rates = 51.

Out of the more than 1,000 actual monthly rates reported for each race, the number which were above or below the provisional ratios for their particular localities by more than the values of twice the standard deviations was only 15% (10/62) of those that would have been expected for the white rates and 10% (5/51) of those that would have been expected for the nonwhite rates; 15% and 10%, that is, of the usually expected 5% referred to above.

It appears unnecessary to allow for as great a potential influence of chance on these provisional ratios of perinatal mortality for 1968-1969 as one would have to do with rates for the same period which had been computed in the usual way.

Table A

In Table A counties and cities are grouped roughly according to the total number of race specific births and, within each group, in the ascending order of their provisional two-year ratios. White and nonwhite statistics are shown in adjacent columns.

Numerical limits of the total births are shown above each group and refer to the number of deliveries reported for the 12-month experiences of each of the year's published set of figures.

Also shown to the right of each rate is the letter designation of the specific table among the following four (B-E) which includes the record of that particular county's or city's rates over the past seven years.

No provisional ratios were calculated for those counties and cities with 100 or fewer race specific births in each of the 12-month periods reported for 1969. They are listed at the end of the table in order to make it inclusive. The average annual number of deaths is shown over the average annual number of births: averages, that is, of the 12 reports of 1969. Figures are rounded off to the nearest whole number. A dash in the numerator implies an average number of deaths that is less than one-half. Because of the probable severe distortion by the effects of chance, those ratios are arrayed in the ascending order of their total numbers of births instead of their mortality.

County and city rates for 1963-1967 and 1964-1968

The provisional 1968-1969 ratios for each county and city which had 101 or more race specific births in at least one of the 12-month reporting periods are then compared to the rates for the same locality covering the two preceeding five-year periods of 1963-1967 and 1964-1968. The purpose is to demonstrate continuity over the entire period of low rates distinguished from high rates.

Excluded from this part of the survey because of insufficient numbers of total births—less than 101 in each of the 12 reporting periods—are 12 counties for their white births, and 37 counties and seven cities for their nonwhite births. The city of Eden, with no past record, is also omitted.

The rates for the period 1963-1967 were taken from the January, 1969 issue of the **Journal,**[4] where they were taulated together with the total births and perinatal deaths which they represent.

The total numbers of births and deaths from which the rates for the second five-year period of 1964-1968 were calculated are also shown in the next four tables (B-E), because of the need to know the relative sizes of the series in any attempt to evaluate the significance of the figures. The annual data for those totals were taken from the official statistics distributed by the State Board of Health.[5]

Rates for the five-year periods are used because of

*Standard Deviation $= \sqrt{\frac{(1\text{-}p) \times p}{n}}$: p-average of 12 monthly race specific "twelve month running means" for perinatal mortality reports of 1969: in per cent (0.000). n- Total number of race specific births in 12 month period ending June 30, 1969 (mid-period).

the obviously reduced influence which chance alone could have had on the proportionate mortality.

The basis for this comparison of those three overlapping periods is the average perinatal mortality rate for the state as a whole, whether the rate for the individual locality was, in each period, below or above the state average for the same period

Based on those averages for the entire state, roughly one half of the counties and cities could be expected to be below, the other half above, in each period. The significant information shown here is how often and when each locality changed from one side to the other of those state averages and by how much.

In the next three major tables (B, C, D) the localities are listed in the left-hand column in the ascending order of their rates for 1968-1969, while those on the right are tabulated in the descending order. This apposes counties and cities with the lowest rates for the period of 1968-1969 in the left-hand column opposite those with the highest rates for the same period in the right-hand column.

A consistently downward or upward trend line is noted by the symbol "**V**" (downward) or "**Λ**" (upward) appearing before the name. Those localities had rates which dropped successively or rose successively from each period to the next regardless of their relationship to the state average.

Table B represents the counties and cities which maintained the same relationship to the state averages in each period. These are the localities which were consistently below or consistently above the state rates. Involving more than half of the localities for which 1968-1969 provisional ratios were computed, Table B lists 72 out of 123 for their white rates, and 46 out of 91 for their nonwhite rates.

Table C includes those counties and cities the rates for which bore the same relationship to the state averages during the first two five-year periods, changing the relationship in the third; that is, in the last two-year period, 1968-1969. Thirty-six are listed for their white rates and 29 for their nonwhite rates.

Table D covers those counties and cities which maintained the same relationship to the state averages in the last two periods, having shifted that relationship after the first of the five-year periods, or between the years of 1967 and 1968. Included here are 11 localities for white rates and 15 for nonwhite rates.

Table E includes the only five localities (four for their white rates and one for its nonwhite rate) which did not bear the same relationship to the state average in any two consecutive periods.

Table F: To accompany the discussion of the fluctuations of the "12-month running means" that were published in reference to 1969 is Table F: a listing of the counties and cities whose monthly rates were consistently below or consistently above the monthly averages for the state as a whole in at least 13 of the first 15 monthly reports.

Minor tables

Interspersed in the text are small tabulations illustrating the consistency of annual rates in regard to their relationship to the state averages; the differing influences of magnitude of rate and number of total births on the potential effects of chance; the variation, for two counties, in the incidence of low birth weight babies; the differences in the state as a whole, for five years, between the perinatal mortality rates for urban and rural residents. There are lists of the counties and cities shown in Tables B and C which had consistent downward or upward trends. Another compilation (Table 7) depicts the frequency of the actual occurrence of fluctuations of various magnitudes from month to month and over the period covered by the first 15 reports of the program.

Particular Characteristics of the Data

The attention of those interested in details of the material should be called to several features which have arbitrary or artificial influence on the data or their meaning.

Statistical inexactness of the provisional ratios for 1968-1969

The calculated averages of the "12-month running means" that were published monthly—the provisional ratios for 1968-1969—do adequately reflect the relative standings of the various counties and cities for those years, but their approximate as well as provisional nature should be realized.

Those ratios do not actually represent definite numbers of deaths divided by definite numbers of births. They are merely the sums of the year's monthly reported rates for each locality divided by 12. They may, for this reason, differ somewhat from perinatal mortality rates that might be computed from the total basic data in the usual way.

The degree to which chance might have affected the provisional two-year rates for the period 1968-1969 is not the same as for the two preceeding five-year periods, although in this study they are treated in much the same way.

Differing "validity" of rates for different periods

It has been noted that, presumably because of the overlapping nature of the "12-month running means" from which they were calculated, those provisional ratios were less subject to the influence of chance than would have been the rates for the same period computed in the usual way.

The influence of chance on those provisional two-year ratios was still considerably greater than on those for the five-year periods. This must be the main reason that nearly two and a half times as many rates shifted from one side to the other of the state averages between the second five-year period, 1964-1968, and the following two-year period, 1968-1969, than between the two consecutively preceeding five-year periods.

Consistency artifically favored

The comparison of rates for three periods, each of which includes one or more years that are also covered by the rates of the subsequent period, tends to favor the appearance of consistency. The differences in rates among successive periods reflect the addition of a single year while dropping one or more of the years of the past.

To check on the extent of this artifical tendency, the separate rates for the seven single years were examined in regard to their relationship to the state average of each year.[6] The provisional rates reported in the **Journal** for the year ending with December, 1969 were used for that year, and 13 counties each were eliminated for their white and nonwhite rates because of the very small numbers of total births (Table 3).

Table 3

Consistency of Relationship Between County and State Rates for Seven Years

No. Years Consistently Above or Below State Rates	White	Non white	Cumulative Total	Cumulative Per Cent
7	5	3	8	5
6	19	14	41	24
5	27	34	102	59
4	36	36	174	100

Nearly a fourth of the county rates shown in Table 3 were consistently above or below the state averages in six or all of the seven years. Well over half were above or below in five or more years. The tendency to consistency is real though only partial.

When much of the fluctuation resulting from the operation of chance is eliminated by using five-year rates and the provisional average ratios for 1968-1969, it is even more apparent that counties with proportionate perinatal losses below the state rates in one period tend to have losses below the state averages in other periods, and those with rates above the state average in one period tend to be above the state averages in the other periods. Over the longer intervals, counties and cities which have low perinatal losses tend to continue to have low losses and those with the higher losses continue to have high losses. This was abolutely or consistently so in from 50% to 60% of the North Carolina localities.

Arbitrary reference to state averages

The reference of county and city rates to their status below or above the state averages is a convenient though artificial arrangement. It does not indicate consistency itself nor show trend lines except incidentally.

Some of the tendency to favor the appearance of consistency which results from the use of rates for overlapping periods of time is, in a way, offset by the arbitrary reference of those rates to the state averages. The latter maneuver tends to favor the extremely low and extremely high rates which would have been less likely to cross the state average as they changed from period to period. The 50% or 60% referred to above, as a measure of consistency itself, would exclude many series of rates which shifted from one to the other side of the state average but never by much. A number of localities with perinatal mortality rates that were consistently below or above the state averages showed greater variations among their three rates, or less consistency, than did some of the others whose relationship to the state average did change.

There are also localities whose rates showed constant downward or upward trends among the counties and cities with rates consistently below or above the state averages as well as among those with rates which crossed from one side of the state average to the other.

Appraisal of the Tables

At the bottom of each of the major tables appears this legend: *Detailed evaluation and careful interpretation are required. The raw data cannot be taken at face value.*

The statement is prominently displayed lest anyone be tempted to offhand quotation or direct reproduction out of context. It is also an acknowledgment of the limitations of the statistics.

There is no question but that potential inexactnesses and uncertainties are inherent in the collection, expression, and interpretation of the figures tabulated here.

Some of the extraneous influences on the data have been mentioned previously as "particular characteristics," but several others should be discussed in explanation of the warning legend.

Underreporting

The use of certificates of legally required registration, impartially handled largely by machines, greatly reduces the doubt that can be raised when institutions calculate their own rates and records. The possible assumption of evasion, careless or willful, is avoided.

The tables faithfully describe the frequencies with which reported pregnancies actually did end in reported perinatal deaths for residents of North Carolina and of its counties and larger cities. Underreporting, however, could have significantly altered some of the rates shown here had it been confined to a relatively small number of locations.

Completeness of registration in the state as a whole was checked for total births in the 1950 census and for "infant deaths under 1500 grams" in 1967. The results were 96.1% complete for the former and 94.1% for the latter.[7] At those rates for the entire 1964-1968 period one could estimate that 1,900 births had gone unreported during those five years (3.9% of 490,260 total births). In 1968 the deaths of 75 low birth weight babies would have gone unreported (5.9% of 1,271 such deaths). Assuming unregistered stillbirths to be equal or twice that many per year for five years would put unreported perinatal deaths between 750 and 1125. The reporting of other neonatal deaths is thought to be virtually complete.[8]

There are a number of uncertainties about those estimates. The distribution of the unregistered events between the races is unknown. The degree to which underreporting of deaths and births might have occurred in the same locality, thereby tending to cancel the effects, is indeterminable. There is no real check on the reporting of fetal deaths, except that those certificates go through county health departments where the nurses might be expected to know of stillbirths among patients of the department prenatal clinics if not among the indigent population in general.

In spite of the approximations, it seems reasonable to conclude that, while underreporting might have affected significantly the rates of any individual county or city, it could not have been a major factor in all of the low perinatal mortality figures nor in all of the high ones.

Chance alone

If the relative capability of any locality to achieve a certain perinatal mortality rate is going to be read into the figures—and it is virtually impossible not to do so—it is necessary to consider the inescapable variability in the concentration of death-producing situations arising during any period of time.

The usual formulas for determining the limits to the potential effect of chance alone do not apply to the provisional ratios for the period of 1968-1969, which are derived from the published "running means." Neither can they be used in comparing the two overlapping five-year rates to each other.

The physician will have to introduce an uncertain and unscientific element by deciding on the basis of his "common sense" how likely it would be that chance alone might explain the complete differences among the rates of any two localities.

In general, and other things being equal, the greater the difference between rates, the less likely will that possibility be. The greater the number of total deliveries involved, the greater will be the opportunity for "good spells" and "bad spells" to cancel each other. The longer a period with relatively constant rates, the less likely will it be that they reflect the uncancelled influences of uncontrollable chance.

Some idea of the influence of the magnitude of a rate and the size of a series on this potential effect of chance can be gotten from Table 4. It lists twice the Standard Deviation calculated* for five representative perinatal mortality rates and each of four series with progressive round numbers of total deliveries. Those rates, plus and minus the values for twice their Standard Deviations, would generally be taken as the limits, plus or minus, to which one would have to go to be virtually assured (95%) that they could not be exceeded by the effects of chance. This implies that if a real series, regardless of size, and remembering its original rate, could be run over again 100 times with chance allowed to have free play as the only variable, only 5 of the 100 results would exceed the original rate by as much as plus or minus twice the standard deviation.

*Standard Deviations $= \sqrt{\frac{(1-p) \times p}{n}}$ p-rates, n-events.

Table 4

Some Representative Values for Twice the Standard Deviation

Size of Series	Rates per thousand 20.0	30.0	40.0	50.0	60.0
250	±17.2	±21.6	±24.6	±27.6	±30.2
500	±12.6	±15.2	±17.6	±19.4	±21.1
1000	± 6.2	±10.8	±12.4	±13.8	±14.8
5000	± 1.9	± 3.4	± 3.9	± 4.4	± 4.7

The information in Table 4 can, among the rates of this review, be used only in connection with the separate five-year figures. For those, however, interpolation will give a fairly close approximation of the virtually maximum (95%) effect which chance might be expected to have on single rates.

As far as this study is concerned, the use of the provisional two-year ratios for 1968-1969 makes the potential influence of chance less than it would have been with rates for single years or with those calculated directly from the numbers of births and deaths. The rates for five-year periods reduce that possibility a good deal more. The demonstration of consistency over three periods of time is quite convincing evidence that the effects of chance have cancelled themselves to a parallel degree.

Still, it must be admitted that neither the magnitude of the difference between perinatal mortality rates, the annual numbers of total deliveries, nor the consistency of the rates over periods of years will guarantee that those differences could not have been caused by chance alone. That guarantee can be approached only as infinity is approached.

Incomparability of series

Many factors enter into interpretation. They mostly have to do with differences among localities which, uncontrollably at the time at least, selectively affect the frequency with which high-risk problems arise or are brought about.

Since the statistics dealt with here have to do only with resident populations regardless of where the deliveries occurred, the assertion that already complicated cases are referred selectively and in unusual numbers to a particular institution or locality is not applicable at all.

Proportions of low economic and educational levels—less specific parameters—correlate directly with perinatal losses. The extent to which, on the one hand, they represent currently unavoidable situations that

must await the spread of sophistication and solvency, or on the other, simply reflect the less personalized, continuous, and detailed attention that the usual private patient gets must remain a matter of conjecture.

Varying the concentration of high-risk cases is, of course, the mechanism through which chance affects mortality rates. Allowance for chance, then, takes into account at the same time the happenstance variations in the incidence of death-producing problems.

Over and above that mechanism are the possible differences in such things as the age distribution of a population, its predominant religion, and the attitude of its citizens toward age at marriage and family size or toward medical care in general which might affect such influential variables as maternal age and gravidity and the promptness with which complications are reported. The incidence of prematurity evidently varies from place to place, for reasons that are not readily apparent, as do local attitudes toward contraception, therapeutic abortion, and the number of high-risk mothers who have been sterilized.

The incidence of low birth weight babies furnishes an example from the years under review which presumably illustrates the effect that differences in the "obstetric population" could have on perinatal mortality rates.

Among the counties with more than 1,000 annual white deliveries, the lowest and the highest provisional white perinatal mortality rates in 1968-1969 were 20.8 per thousand and 35.2 (Table A): a difference of 14.4.

Those same counties, according to the official tabulations for "prematures," also showed the lowest and the highest incidences of low birth weight white babies.[9] The figures for three consecutive years are shown in Table 5.

Table 5

Incidence of Low Birth Weight Babies*

	"Low Rate County"			"High Rate County"		
Year	Total Births	Total Low Birth Weight	%	Total Births	Total Low Birth Weight	%
1968	1175	61	5.2	1104	127	11.5
1967	1224	84	6.9	1084	105	9.5
1966	1174	101	8.6	1156	113	9.7
Total	3573	246	6.9	3344	345	10.2

*Annual numbers of white babies weighing 2500 grams or less at birth, divided by total white births.

Had the counties represented in Table 5 both experienced a specific perinatal mortality among their low birth weight white babies of 239 per thousand as the whole state did in 1968,[10] the "low-rate county" would have lost 59 and the "high rate county" 82. The respective mortality ratios per thousand total white births would have been 16 (59/3573 x 10) and 24 (82/3344 x 10).

Of the difference of nearly 15 per thousand in the two overall provisional mortality rates, one could justifiably hypothesize that 8 per thousand might have been contributed to the higher rate by the excess of low birth weight babies (24-16).

An undeterminable portion of that excess could be the result of chance. During those same three years the incidence of low birth weight nonwhite babies in the much smaller total number of nonwhite births was larger in the "low rate county" (80/452-10 = 17.7) than in the "high rate county" (49/328 x 10 = 15.0). But it surely seems that some peculiarity in the latter's white series must have been at least partially responsible over a period of three years for the delivery of nearly half again as great a proportion of low birth weight white babies in that latter county as in the former.

Low birth weight is probably the most frequent specific complication of pregnancy among white populations, and any with specific mortality rates greater than 239 per thousand would be at least proportionately more rare. The example does, therefore, give some basis for guessing at the possible effect on perinatal mortality of differences in the characeristics of two North Carolina populations under comparison. The conclusion seems justified as a rather gross approximation that it would be a most unusual situation when differences in a single population characteristic could account for more than eight white perinatal deaths per thousand. Applying the same relationship to the 100% higher nonwhite perinatal mortality rates, one could estimate that a population difference which might account for more than 16 nonwhite perinatal deaths would also be most unusual.

Any effort at comparison calls for some consideration of the type of people involved. A claim that population differences explain large variations in perinatal mortality cannot be categorically denied, but it should be accompanied by some sort of objective substantiation.

Any evidence that such an unequally occurring population characteristic contributed to perinatal loss would by itself be important information and the basis first for further investigation and then for specific efforts at counteraction.

Importance of perinatal loss

It must be admitted, too, that some things may be considered worse than perinatal mortality. This refers not just to the congenitally abnormal child who survives without being able to appreciate its existence, but to matters of obstetric judgment. In balancing the risks of intervention for the sake of the fetus there will be times when the physician may feel compelled to consider the age of the mother, the number and condition of her already living children, and the likelihood that she will become pregnant again the following year.

Conscientious doctors may on occasion consider the probable loss of the child preferable to a procedure that may or may not save the fetus while endangering the mother.

Justification of the Tables

In the face of those inexactnesses and uncertainties that might unavoidably affect the perinatal mortality rates, there has to be some justification of their publication.

First, the influence of some of them would be small; of the others only potential. Opposing influences may tend to cancel their effects on any single rate.

The possibility that the extraneous influences might be spread fairly evenly over many or all of the rates is about as real, until proven otherwise, as that they would be concentrated on any one or on a certain few.

The rates for which "validity" would be most difficult to establish might not be the ones that would deserve the most concern. Such a statistical study as this can be seen as primarily a means for distinguishing those localities with either or both the highest and most consistently high rates of loss. The deviations of those rates from the state average or from the lower rates would, from several points of view, be the most likely to be "valid." They would represent the localities in which reductions of perinatal loss might be expected to be most feasible as well as most desirable.

If, for instance, within each grouping by number of births the top 10% of counties had had losses which instead were equal to those for the state as a whole in 1968-1969, that state average would have been reduced by about 4% of its actual amount for each race. Those represent salvages which from now on will be considered large.

From this rather narrow and not completely applicable point of view, the significance of the lower, potentially less "valid" 90% of the rates would not be so great anyway. To the physicians in those counties and cities they would be largely matters of reassurance.

The major justification for publishing the tables, though, is that proof positive is not essential. All that is really required is reasonable doubt that uncontrollable chance alone could have explained the entire difference among low rates and high rates, or between consistent rates and those for the state as a whole.

With this stipulation, that they are not infallible and that they require detailed evaluation and careful interpretation, the statistics shown here should interest local physicians as objective measurements of one of the main purposes of obstetrics. It might be recalled that the original assumption of the program here being reviewed was that local physicians would want to know how their own communities stood in regard to perinatal loss when compared with other counties and cities and the state as a whole.

In spite of the inexactnesses and uncertainties of the data, few specialities have a more meaningful criterion of success than perinatal mortality rates that are consistently below the state average or are continually dropping. Conversely, there are few situations in the field of medicine which more surely call for conscientious examination than constantly rising perinatal loss rates, rates that are consistently in the upper ten percentile of the localities with roughly similar numbers of deliveries, or rates which over a period of years come near doubling those in the lowest brackets.

It would seem distinctly unrealistic as well as arbitrarily defensive to insist that continuing high rates in certain localities while others continue to have low rates could not reliably point to the existence of correctable problems in the former or that those problems should not be considered properly, if not preferably, as concerns of the medical profession.

In the data tabled here, then, the standing of each county and city will have to be studied separately in regard to its level within the group of similar sized series, with reference to any period of consistency in its relation to the state average, from the point of view of continued trends, and in consideration of certain characteristics which may be compared with other localities.

The Practitioner's Part

The logical person to make that study is the local practitioner. Only he is intimately familiar with existing conditions in his area; he alone or his confreres have to do the professional obstetrics, and his interest if not

activity is essential to any attempt at reduction of his county's or city's rates.

If the loss rates for his own county or city are high enough or are consistently so over a sufficient period of time to suggest the probability that factors other than chance alone are represented, he will have to consider what those other factors might be.

Potentially Influential Factors Other Than Chance

The article which introduced the routine reporting of perinatal mortality rates pointed out that each of those possible factors other than chance was potentially subject to modification and could, for the convenience of identification, be put into one or another of three categories:

1. Characteristics of the population
2. Features of the available facilities
3. Attributes of the processes and practices of the individuals supplying the maternity care.

The interested physician of a county or city with a high perinatal loss rate will have to investigate the rates of other localities. If he finds one with presumably similar population characteristics but low rates, particularly if he also discovers one with high rates but different characteristics, he has to doubt that the local problem can be attributed to the community's people.

Should he also be unable to assure himself that the facilities available to the physicians of his county or city are significantly inferior to those of other localities with low rates, he must turn his attention to the processes and practices of the personnel concerned with obstetric care.

Any scrutiny of processes and practices must include self-critical consideration of the possibility that function of the essentially emergency service of the labor and delivery rooms might allow an occasional baby to die or be critically handicapped for survival through delay in appropriate treatment, or because some nontraumatic method of delivery failed to get it born at least one moment before irreversible damage had been done. The possibility has also to be entertained that some regimen or routine might lead to occasionally critical and irreversible harm to the fetus.

It has to be remembered that the potential margin of salvage is small to begin with. The difference between low and high rates, even though they vary by 100%, is only the equivalent of something like two white babies out of the average 100 consecutive white births or five nonwhite babies out of 100 nonwhite births. It is the occasional case that makes the trouble, but the successful outcome of none can really be presumed until actual birth has been completed.

The ultimate purpose

Finally, if the program begun last year is to have positive value, the physician could be expected to make known his opinions and recommendations in staff meetings if not in other proper circles of his community.

The Major Tables

These tables are primarily for the information of the local physician concerning his own county and cities and others with which he may be familiar or whose perinatal rates are in contrast to his own. They speak largely for themselves. A few notes are added to point out and enlarge upon some features that might overlooked.

Table A

Attention is called to the differences between the white and non-white perinatal mortality rates of the larger cities.

Twenty-two of the cities with populations of 10,000 and more had white rates that were below the state average in 1968-1969, compared to 14 that were above.

For nonwhite residents, on the other hand, the ratio was 10 below and 18 above. (Nonwhite rates were not calculated for eight of those cities because of too few nonwhite births.)

The ratio of 61% below the state average for white rates (22/36) suggests that white residents of the larger cities where, for one thing, obstetric specialists tend to congregate, are less likely to lose babies than those who live elsewhere.

This fact is particularly prominent in regard to the four cities with more than 1,000 white births a year. That is the only group in which each locality had rates below the state average and where there was no marked span between the lowest and the highest rates.

The information would seem to support the recent concern over medical care in rural areas except for the evidence given in Table 6.[11]

The "urban" figures in Table 6 refer to residents of communities of more than 2,000 persons. These statistics must be distinguished from those of metropolitan areas. These race-specific data were not found in the official "Vital Statistics 1965."

That the relatively favorable figures for the rural areas are not just matters of selective underreporting is implied in a separate study of individual counties for the single year of 1964. In that year 35 of the 66 counties with both urban and rural residents (54%) had lower perinatal mortality rates for their white rural residents than for their white urban residents. In the 35 totally rural counties together, the rate for white perinatal mortality was 28.5 per thousand compared to 29.3 for the entire state.

Moreover, in those years the fetal deaths in the rural areas constituted a larger proportion of the perinatal mortality than they did in the urban areas. The suspicion that the registration of stillbirths in the rural regions might have been less complete does not seem, on the surface at least, to be borne out.

With the white rural residents evidently losing fewer babies proportionately than white urban residents, and the white populations of the four largest cities losing fewer than either, more responsibility is put on the smaller communities—those with populations from 2001 up to and including all those that do not have more than 1000 race specific births a year.

This would seem to substantiate the current emphasis on the superiority of obstetric services in the larger hospitals except that, as is evident in Table B, a number of cities with small hospitals—some for that matter without specialists—had white perinatal mortality rates that in all three periods were consistently as low as or lower than those of the cities with large hospitals and a greater number of births. The statistics shown in Table B appear to imply some local peculiarity rather than anything absolute to do with size itself.

The proportion of cities with nonwhite rates below the state average in 1968-1969 was, by contrast to the situation with the white population, only 36% (10/28), apparently pinpointing the existence of a special problem to which the larger cities of the state might be prone.

Again the situation seems to be referable to individual cities rather than to size itself. Table B, for instance, shows eight cities with nonwhite rates that were consistently above the state average in all three periods of this survey, and in three of them none of the rates were below 60 per thousand. One the other hand, there were five cities with nonwhite rates below the state average in each of the three periods. Six of the 15 rates for those five cities were in the 30's per thousand, eight in the 40's, and only one in

Table 6

Perinatal Mortality Rates for Urban and Rural Residents of North Carolina

Year	White		Nonwhite	
	Urban	Rural	Urban	Rural
1968	(698/24038) 29.0	(1213/41904) 29.0	(648/12179) 53.1	(740/16108) 45.9
1967	(679/24123) 28.1	(1162/40918) 28.5	(607/12315) 54.1	(870/16877) 51.5
1966	(710/23912) 29.7	(1228/41078) 29.9	(623/12093) 51.6	(869/17348) 50.0
1964	(813/27296) 29.7	(1339/46088) 29.0	(785/13671) 57.1	(1109/20943) 53.2
1963	(866/27599) 32.0	(1338/46842) 28.5	(739/13523) 54.8	(1099/21286) 51.7
Total	(3786/126968) 29.7	(6280/216850) 29.0	(3402/63781) 53.8	(4687/92562) 50.5

TABLE A

RESIDENT PERINATAL MORTALITY RATES
COUNTIES & 36 LARGEST CITIES of NORTH CAROLINA

In ascending order of provisional rates for 1968-1969* grouped according to number of annual deliveries, with letter reference to following tables of 7-year statistics

More than 100 births in at least one 12 mo. period. None over 250

COUNTIES (white)		COUNTIES (non-white)	
Northampton	00.9 B	Randolph	36.3 B
Dare	11.5 D	Pender	36.5 B
Yancy	18.3 B	Chatham	38.3 B
Mitchell	21.3 C	Hoke	38.8 C
Graham	22.7 E	Brunswick	39.3 B
Swain	24.5 C	Montgomery	39.3 D
Franklin	26.2 B	Catawba	39.9 B
Bladen	27.5 E	Moore	40.1 D
Polk	28.3 C	Warren	42.4 C
Entire State	28.4	Orange	43.9 B
		Davidson	44.6 C
Avery	28.6 B		
Hoke	28.9 B	Entire State	49.4
Macon	29.2 C		
		Lee	51.4 C
Bertie	29.6 C		
Madison	30.5 B	Bladen	51.5 B
Allegheny	31.9 B	Person	52.4 B
Hertford	33.5 B	Washington	52.7 C
Granville	37.1 B	Stanly	53.5 D
		Greene	54.3 B
Anson	37.4 C	Caswell	56.7 B
Caswell	38.4 B	Pasquotank	57.7 C
Washington	38.5 C	Gates	59.4 B
Martin	41.1 C	Beaufort	60.7 B
Pender	50.6 C	Rutherford	71.7 C
CITIES		CITIES	
Lumberton	17.7 C	Reidsville	35.2 B
Sanford	22.8 B	Asheville	36.7 B
Eliz. City	23.0 B	Greenville	38.2 B
New Bern	23.9 B	Thomasville	43.9 C
Shelby	27.0 C	Burlington	48.0 D
Roanoke Rapids	27.1 C	Gastonia	48.6 B
Lenoir	27.9 C		
Entire State	28.4	Entire State	49.4
Salisbury	28.9 C	Shelby	52.2 C
Albemarle	32.5 B	Eliz. City	53.1 C
Concord	37.5 B	Monroe	53.4 B
Monroe	37.6 B	Henderson	55.2 C
Henderson	39.2 C	Salisbury	59.0 C
Reidsville	42.2 B	Kinston	61.0 B
Thomasville	44.3 C	Hickory	63.6 C
		Statesville	63.9 B
		New Bern	65.0 B
		Concord	65.1 D
		Lumberton	67.0 D

More than 250 births in at least one 12 mo. period. None over 500

COUNTIES (white)		COUNTIES (non-white)	
Lee	13.7 B	Union	33.2 C
Chatham	15.1 C	New Hanover	34.3 C
Cherokee	16.8 B	Buncombe	36.5 B
Halifax	16.8 B	Columbus	41.2 C
Montgomery	19.4 C	Harnett	42.3 C
Pasquotank	22.0 B	Bertie	42.9 B
Jackson	23.3 B	Onslow	43.6 B
Duplin	24.8 B	Duplin	45.3 B
Brunswick	25.0 C	Gaston	46.4 B
Edgecombe	27.1 C	Johnston	48.1 C
Entire State	28.4	Alamance	48.5 B
		Scotland	49.0 B
Beaufort	28.9 C		
Yadkin	31.7 B	Entire State	49.4
Vance	32.1 C		
Davie	32.5 B	Cleveland	49.9 C
Person	33.2 D	Cabarrus	50.5 C
Sampson	33.8 C	Lenoir	51.6 B
Moore	35.6 B	Rowan	52.0 C
Richmond	36.1 B	Anson	52.9 B
Transylvania	36.2 C	Rockingham	53.7 C
Watauga	36.9 B	Vance	54.4 B
Stokes	37.6 B	Northampton	55.7 B
Alexander	37.9 B	Franklin	56.8 B
Scotland	39.2 B	Richmond	58.2 D
Ashe	41.5 B	Craven	61.7 D
CITIES		Martin	64.5 D
Kinston	11.4 C	Iredell	65.8 B
Rocky Mount	12.0 D	Granville	66.7 D
Chapel Hill	21.7 B	Sampson	68.5 C
Goldsboro	21.8 B	Hertford	80.6 D
Wilson	22.9 B	CITIES	
Eden	22.2	Wilmington	33.4 C
Hickory	24.1 C		
Lexington	26.0 C	Entire State	49.4
Jacksonville	27.0 B		
Entire State	28.4	Wilson	56.0 E
		High Point	58.1 D
Greenville	30.6 E	Goldsboro	63.0 C
Statesville	33.6 C	Rocky Mount	79.3 B

* See "Features of the Program" at the beginning of the text.

DETAILED EVALUATION AND CAREFUL INTERPRETATION ARE REQUIRED - THE RAW DATA CANNOT BE TAKEN AT FACE VALUE

TABLE A (continued)

More than 500 births in at least one 12 mo. period. None over 1000

COUNTIES (white)		COUNTIES (non-white)	
Nash	20.1 D	Durham	36.4 B
Wilson	22.7 B	Wilson	46.3 C
Lenoir	23.4 B	Pitt	46.4 B
Columbus	24.4 C	Edgecombe	46.6 D
Carteret	24.9 D	Halifax	47.6 C
Pitt	26.4 B	Entire State	49.4
Orange	26.8 B		
Wilkes	28.0 B	Nash	50.5 B
Entire State	28.4	Wayne	60.9 B
Cleveland	28.6 D	CITIES	
Robeson	29.0 B	Durham	38.1 D
Rutherford	29.8 B	Greensboro	49.3 C
Burke	30.3 C	Entire State	49.4
Iredell	32.3 C	Fayetteville	53.4 B
Rockingham	32.5 B	Raleigh	65.7 B
Surry	33.0 B		
Johnston	33.7 B	More than 1000 births in at least one 12 mo. period	
McDowell	34.0 B		
Haywood	34.3 D	COUNTIES	
Union	34.4 B	Mecklenburg	40.1 B
Harnett	36.4 B	Robeson	43.3 B
Henderson	36.4 B	Entire State	49.4
Lincoln	37.0 B	Cumberland	49.5 C
Stanly	41.0 B	Wake	54.1 D
CITIES		Guilford	54.3 B
Durham	20.5 D	Forsyth	59.7 B
Burlington	25.8 E	CITIES	
Entire State	28.4	Charlotte	41.2 B
Gastonia	30.6 B	Entire State	49.4
Wilmington	31.6 B	Winston Salem	60.6 B
Asheville	33.3 B		
High Point	33.6 B		
Fayetteville	34.7 B		

* In Ascending Order of Total Births.

** Dash in Numerator Indicates Deaths but Annual Average Less than One Half.

More than 1000 births in at least one 12 month period

COUNTIES (white)	
Randolph	20.8 B
Wayne	21.2 B
Mecklenburg	22.7 B
Durham	23.2 D
Wake	24.1 B
Craven	24.9 B
Catawba	25.3 C
Rowan	25.8 B
Onslow	25.9 D
Forsyth	26.2 B
Gaston	28.2 B
Entire State	28.4
Cabarrus	28.7 B
Davidson	29.3 C
Alamance	29.5 D
Cumberland	31.1 B
New Hanover	31.3 C
Guilford	31.6 C
Buncombe	32.6 B
Caldwell	35.2 B
CITIES	
Winston-Salem	23.3 B
Charlotte	23.5 B
Raleigh	26.6 C
Greensboro	27.8 B
Entire State	28.4

100 or less births in ea. 12 mo. period*	Average annual deaths/ births 1968-9
Tyrell	1/27
Gates	-/37**
Hyde	-/40**
Camden	1/51
Currituck	-/55**
Perquimans	7/60
Jones	1/67
Warren	2/70
Pamlico	2/83
Clay	4/86
Greene	2/88
Chowan	1/90

100 or less births in each 12 mo. period In order *

Average annual births/ deaths 1968-9

COUNTIES (non-white)	
Clay	0/1
Madison	0/2
Mitchell	0/3
Allegheny	0/3
Ashe	1/3
Avery	0/3
Watauga	0/4
Yancey	1/5
Macon	-/7**
Dare	0/9
Graham	0/11
Cherokee	2/14
Transylvania	1/20
Haywood	2/20
Tyrell	2/29
Yadkin	2/33
Polk	2/34
Currituck	3/34
Camden	1/34
McDowell	1/35
Alexander	3/38
Henderson	1/40
Stokes	1/46
Hyde	3/49
Jackson	1/50
Perquimans	2/52
Wilkes	2/53
Swain	2/54
Pamlico	3/59
Surry	6/62
Davie	5/64
Jones	3/75
Carteret	3/81
Burke	4/84
Chowan	5/90
Caldwell	4/93
Lincoln	5/95
CITIES	
Roanoke Rapids	2/43
Lenoir	2/47
Albemarle	4/49
Chapel Hill	5/52
Jacksonville	2/55
Sanford	2/67
Eden	5/72
Lexington	4/80

DETAILED EVALUATION AND CAREFUL INTERPRETATION ARE REQUIRED - THE RAW DATA CANNOT BE TAKEN AT FACE VALUE

the 50's (51.1). The disproportion in favor of rates above the state average which is evident in Table A is more marked among the cities with smaller series, but there are low and high rates in each category by number of nonwhite births.

As for their urban-rural distribution, the nonwhite rates for the state as a whole were again lower for the latter, more so in magnitude but less generally so. Of the 65 counties with both urban and rural residents, the rates for 1964 were lower for the urban residents in 32 and for rural residents in only 29. In four of these counties there were no nonwhite perinatal deaths. Evidently in those urban centers where the rates were higher, the losses must have been particularly great.

That a problem may exist for a number of the larger cities is equally evident when their white and nonwhite rates are compared. For well over half the cities listed in the monthly reports, the differences between their white and nonwhite rates is greater than that which existed between the race specific rates for the state as a whole. For nine of them, the discrepancy in the 1968-1969 rates was more than half again as great as in the state as a whole.

Table B

It is difficult to imagine that anyone could note the consistent differences between the perinatal mortality rates for most of the top five or ten counties, at least in each of the left- and right-hand columns, and not suspect that during the period of seven years they represent causes over and above the potential effects of chance. This could be said of both races, and perhaps for the top five cities in regard to white rates and the top three or four for their nonwhite rates.

The trends of these rates over the three periods are interesting and considerably modify the interpretation:

Of the localities whose rates were **below the state averages,** the following showed a continuing **downward** trend:

White: Northampton, Lee, Halifax, Yancey, Wayne, Mecklenburg, and Wilson counties; the cities of Chapel Hill, Winston-Salem, and Charlotte.

Non-white: Durham, Buncombe, Pender, Mecklenburg, Robeson, and Pitt counties; the cities of Reidsville, Asheville, Greenville, Charlotte.

None of the localities in this group showed a continuing upward trend.

Of the localities whose rates were above the state averages, the following showed a continuing downward trend:

White: Caldwell, Union, Rutherford, Robeson, Hoke, and Cabarrus counties; the cities of Monroe and Wilmington.

Non-white: Northampton, Vance, Guilford, Anson, and Person counties; the city of Monroe.

In the "above average" category, the following localities showed a continuing upward trend:

White: Ashe, Stanly, Scotland, Alexander, Stokes, Granville, Watauga, Henderson, Richmond and Cumberland counties; the city of Reidsville.

Non-white: Iredell, Wayne, Gates, and Caswell counties; the cities of Raleigh and Statesville.

It is noteworthy that none of the rates which were below the state averages showed upward trends. The low rates seem only to be getting lower.

Eleven counties and three cities (white and nonwhite together) among those with rates consistently above the state averages nonetheless had continuously dropping rates in each successive period. Such a record virtually relieves those localities of serious concern. No one can object to continually falling rates.

On the other hand, the possibility of a correctable problem becomes more urgent for the 14 counties and three cities with rates consistently above the state averages and continuing to rise in each consecutive period.

Table C

For the localities listed in Table C, continuous trend lines could cross the state average. It was impossible, however, for those counties and cities in the left-hand column, which had rates that fell below the state average during that last period, to show continually rising trends. In the same way, there could not be any dropping trend lines for those localities listed in the right-hand columns as having rates which rose above the state averages in 1968-1969. The localities and the trends which they did show are listed below inasmuch as they also affect interpretation:

Counties

Downward		Upward	
White	**Non-white**	**White**	**Non-white**
Chatham	Union	Martin	Rutherford
Montgomery	New Hanover	Anson	Pasquotank
Mitchell	Columbus	Transylvania	Rockingham
Columbus	Harnett	Sampson	Lee
Swain	Warren	Burke	Cabarrus
Brunswick	Wilson	Macon	Cumberland
Edgecombe	Johnston	Beaufort	
Cities			
Kinston	Wilmington	Henderson	Hickory
Lumberton	Greensboro	Statesville	
Hickory		Salisbury	
Lexington			

Again, there can be no serious problem as long as successive rates keep dropping as they did for those 21 localities in the left-hand columns. More serious, though, is that among those rates which had shifted from below to above the stage averages in 1968-1969, the change for 17 was continuing a trend that had gone on for some time before.

Some comment should be made about the differences in the variability of rates from the first to the second five-year period in contrast to that which occurred between the second five-year period and the last or two-year period.

Counties and cities had remarkably consistent perinatal loss rates over both of the periods 1963-1967 and 1964-1968. With regard to the white rates, none of the 36 counties and only one of the 12 cities varied from one to the other period by as much as 5 per thousand, and only two others by as much as 4 per thousand. As for the nonwhite rates, only six of the 28 counties and one of the nine cities had variations of 5 or more per thousand, and of those only three varied by more than 7, and none by more than 9. The variability that has to be allowed for the potential effect of chance on five-year series of the size of North Carolina counties and their larger cities is relatively small. In this study it could not have amounted to more than 5 per thousand for the white rates and 10 per thousand for the nonwhite rates.

On the other hand there were many rates for 1968-1969, both for white and nonwhite populations and for counties and cities, which were above or below their rates for the previous five-year period (1964-1968) by 10 or more per thousand.

Those changes in the provisional ratios for 1968-1969 from the rates for 1963-1967 and 1964-1968 presumably reflect to a major degree the greater influence of chance alone on the two-year figures than on those of the five-year figures, even though that influence was less than it would have been with rates calculated in the usual way.

Just the same, there were localities listed in Tables B and D as well as in Table C with rates which changed so much, so progressively from period to period and with the final figure for a two-year period suggesting permanence, that it is difficult to see how chance could have been the sole cause. Some of the changes in certain counties and cities seem to imply that alterations in one or another of the three categories of influential factors other than chance had actually occurred.

Personal contact by the author during the latter part of 1969 turned up a number of situations which coincided with some of the more dramatic changes in rates. Some of these deserve mention.

TABLE B

WHITE RESIDENT PERINATAL MORTALITY RATES
COUNTIES & 36 LARGEST CITIES of NORTH CAROLINA
7 YEARS

Rates at and below or above the State averages consistently in three consecutive periods of time; 1963-7, 1964-8, and 1968-9: in ascending order (left) and descending order (right) of perinatal mortality rate for the period 1968-9

At or Below State Averages	Period				Above State Averages	Period			
Area	1968-9	1964-1968**		1963-1967	Area	1968-9	1964-1948**		1963-1967
Entire State	28.4	(9833/336503)	29.2	29.4	Entire State	28.4	(9833/336502)	29.2	29.4
* County					* County				
v Northampton	0.9	(11/571)	19.3	21.4	^ Ashe	41.5	(64/1748)	36.6	33.5
v Lee	13.7	(53/2195)	24.1	25.2	^ Stanly	41.0	(111/3018)	36.8	33.6
Cherokee	16.8	(34/1353)	25.1	20.8	^ Scotland	39.2	(56/1509)	37.1	36.4
v Halifax	16.8	(57/2074)	27.5	29.0	v Caswell	38.4	(34/730)	46.6	48.0
v Yancey	18.3	(22/1161)	18.9	21.7	^ Alexander	37.9	(48/1427)	33.6	30.0
Randolph	20.8	(165/5918)	27.9	27.7	^ Stokes	37.6	(61/1889)	32.3	30.5
v Wayne	21.2	(147/5951)	24.7	26.8	^ Granville	37.1	(45/1236)	36.4	35.4
Pasquotank	22.0	(35/1375)	25.5	21.1	Lincoln	37.0	(91/2500)	36.4	38.0
v Mecklenburg	22.7	(535/22109)	24.1	26.0	^ Watauga	36.9	(58/1667)	34.8	34.0
v Wilson	22.7	(67/2865)	23.4	26.1	Harnett	36.4	(98/3040)	32.2	34.0
v Jackson	23.3	(32/1246)	25.7	28.2	^ Henderson	36.4	(110/3454)	31.8	31.7
Lenoir	23.4	(83/2935)	28.3	26.6	^ Richmond	36.1	(88/2541)	34.6	30.7
Wake	24.1	(385/13857)	27.8	27.3	Moore	35.6	(83/2600)	31.9	33.7
v Duplin	24.8	(51/2036)	25.0	25.9	Caldwell	35.2	(220/5742)	38.3	37.2
Craven	24.9	(162/5647)	28.7	27.9	v Union	34.4	(137/3617)	37.9	39.2
Rowan	25.8	(148/5727)	25.8	24.9	McDowell	34.0	(81/2583)	31.4	31.8
Forsyth	26.2	(344/13501)	25.5	26.1	Johnston	33.7	(126/3685)	34.2	32.1
Franklin	26.2	(29/993)	29.2	29.1	Hertford	33.5	(26/650)	40.0	38.8
Pitt	26.4	(92/3586)	25.7	27.6	Surry	33.0	(145/4616)	31.4	33.4
Orange	26.8	(98/3627)	27.0	26.1	Buncombe	32.6	(385/11264)	34.2	33.2
Wilkes	28.0	(121/4224)	28.6	28.1	Davie	32.5	(62/1386)	44.7	40.2
Gaston	28.2	(329/12165)	27.0	27.3	Rockingham	32.5	(153/5067)	30.2	31.3
					Allegheny	31.9	(22/647)	34.0	40.0
					Yadkin	31.7	(58/1974)	29.4	30.0
					^ Cumberland	31.1	(545/18333)	29.7	29.6
					Madison	30.5	(45/1276)	35.3	34.4
					v Rutherford	29.8	(122/3638)	33.5	35.3
					v Robeson	29.0	(100/3244)	30.8	31.9
					v Hoke	28.9	(18/565)	31.9	32.7
					v Cabarrus	28.7	(173/5197)	33.3	34.2
					Avery	28.6	(36/1164)	30.9	30.3
CITIES					CITIES				
v Chapel Hill	21.7	(35/1222)	28.6	28.8	^ Reidsville	42.2	(29/827)	35.0	33.5
Goldsboro	21.8	(60/2297)	26.1	22.9	v Monroe	37.6	(34/833)	40.8	52.2
Sanford	22.8	(29/1033)	28.0	28.0	Concord	37.5	(37/1182)	31.3	34.0
Wilson	22.9	(36/1583)	22.7	25.5	Fayetteville	34.7	(183/5690)	32.1	32.1
Eliz. City	23.0	(24/855)	28.0	27.8	High Point	33.6	(139/4446)	31.2	32.0
v Winston Salem	23.3	(185/6973)	26.5	27.4	Asheville	33.3	(154/4563)	33.7	33.6
v Charlotte	23.5	(380/14953)	25.4	27.2	Albemarle	32.5	(30/836)	35.8	33.0
New Bern	23.9	(22/832)	26.4	21.7	v Wilmington	31.6	(83/2571)	32.2	36.9
Jacksonville	27.0	(65/2356)	27.5	26.5	Gastonia	30.6	(132/4143)	31.8	29.7
Greensboro	27.8	(227/8384)	27.0	27.9					

* v indicates consistently downward trend
* ^ indicates consistantly upward trend

** 1964-1968 (deaths/deliveries) Rate

DETAILED EVALUATION AND CAREFUL INTERPRETATION ARE REQUIRED - THE RAW DATA CANNOT BE TAKEN AT FACE VALUE

TABLE B (continued)

NON-WHITE RESIDENT PERINATAL MORTALITY RATES
COUNTIES & 36 LARGEST CITIES OF NORTH CAROLINA
7 YEARS

Rates at and below or above the State averages consistently in three consecutive periods of time; 1963-7, 1964-8, and 1968-9: in ascending order (left) and descending order (right) of perinatal mortality rate for the period 1968-9

At or Below State Averages	Period				Above State Averages	Period			
Area	1968-9	1964-1968**		1963-1967	Area	1968-9	1964-1968**		1963-1967
Entire State	49.4	(7923/153758)	51.5	52.2	Entire State	49.4	(7923/153758)	51.5	52.2
* COUNTIES					* COUNTIES				
Randolph	36.3	(24/778)	30.8	34.6	^ Iredell	65.8	(96/1706)	56.3	52.8
v Durham	36.4	(215/4599)	46.7	51.3	^ Wayne	60.9	(181/3320)	54.5	53.9
v Buncombe	36.5	(68/1595)	42.6	42.7	Beaufort	60.7	(75/1423)	52.7	52.8
v Pender	36.5	(45/962)	46.8	49.4	Forsyth	59.7	(393/5928)	68.7	65.1
Chatham	38.3	(29/992)	29.2	37.2	^ Gates	59.4	(30/529)	56.7	53.9
Brunswick	39.3	(48/941)	51.0	44.1	Franklin	56.8	(96/1540)	62.3	59.3
Catawba	39.9	(54/1146)	47.1	46.5	^ Caswell	56.7	(56/1042)	53.7	52.2
v Mecklenburg	40.1	(485/10228)	47.4	48.3	v Northampton	55.7	(117/1923)	60.8	62.9
Bertie	42.9	(82/1611)	50.9	49.9	Greene	54.3	(64/958)	66.8	62.2
v Robeson	43.3	(350/7573)	46.2	48.5	v Vance	54.4	(112/2001)	56.0	59.0
Onslow	43.6	(72/2231)	32.3	33.4	v Guilford	54.3	(451/7907)	57.0	57.7
Orange	43.9	(52/1284)	40.5	43.5	v Anson	52.9	(99/1567)	63.2	64.3
Duplin	45.3	(68/1750)	38.9	39.8	v Person	52.4	(77/1158)	66.6	67.2
Gaston	46.4	(95/2514)	37.8	41.4	Lenoir	51.6	(157/2523)	62.2	59.8
v Pitt	46.4	(171/3552)	48.1	48.5	Bladen	51.5	(73/1300)	56.2	53.2
Alamance	48.5	(104/2296)	45.3	47.9	Nash	50.5	(170/3017)	56.3	61.6
Scotland	49.0	(63/1354)	46.5	50.7					
CITIES					CITIES				
v Reidsville	35.2	(23/590)	38.9	42.0	Rocky Mount	79.3	(89/1384)	64.2	70.5
v Asheville	36.7	(63/1353)	46.5	47.8	^ Raleigh	65.7	(162/2913)	55.6	53.8
v Greenville	38.2	(42/889)	47.4	51.1	New Bern	65.0	(43/654)	65.7	57.1
v Charlotte	41.2	(429/8703)	49.2	49.7	^ Statesville	63.9	(43/750)	57.3	54.1
Gastonia	48.6	(45/1155)	38.9	39.4	Kinston	61.0	(91/1173)	77.5	72.0
					Winston Salem	60.6	(372/5551)	67.0	66.2
					Fayetteville	53.4	(180/3356)	53.6	53.0
					v Monroe	53.4	(35/501)	69.8	75.8

* v indicates consistently downward trend
^ indicates consistently upward trend

** 1964-1968 (deaths/deliveries) Rate

DETAILED EVALUATION AND CAREFUL INTERPRETATION ARE REQUIRED - THE RAW DATA CANNOT BE TAKEN AT FACE VALUE

In one city which had had remarkably low nonwhite losses, two young obstetric specialists for a number of years had taken personal responsibility for the labor and delivery of all "indigent" patients. The system could not be continued and the routinely personalized care by those specialists was abandoned. The nonwhite perinatal mortality went up by 400% that year and nearly 200% more the next.

In another city the nonwhite rates showed a marked reduction. A large, new hospital had been opened and the "indigent" patients, formerly delivered in a hospital which had been closed, became the responsibility of a group of obstetric specialists.

The high white rate dropped in one city when the overworked "solo" specialist was joined by an associate, while the nonwhite rates which had been particularly low for several years in another county rose rapidly when the roster of no longer young general practitioners was seriously reduced by death. There were no obstetric specialists in the latter county and the white rates went up at the same time.

In a number of localities with abruptly falling rates, both white and nonwhite, some shown in Table B as well as in Table C, and in nearly all instances reversing the prior direction of a trend, the attention of local practitioners had previously been called directly and/or through the county health director to rates which had been particularly high. It is known that in at least one city where marked reductions in both white and nonwhite mortality rates occurred, the monthly published perinatal mortality rates had been regularly discussed at hospital staff meetings.

A cause and effect relationship cannot, of course, be claimed. Rates rose in three counties where their previously low level had been pointed out to local physicians. In the state as a whole, moreover, there were six more counties whose white rates rose above the state averages in 1968-1969 than those whose white rates fell below.

It should be noted, however, that in seven of those localities where the rates shifted from below to above the state averages, the numerical differences were small compared to those where the rates fell. There were, moreover, four fewer cities with rates which rose above the state averages than with those which dropped below. Actually the total number of localities with white rates that dropped in the 1968-1969 period, regardless of their relationship to the state averages, was 72 as opposed to 49 in which they rose. The same ratio for nonwhite rates was 46 to 40.

It is strongly intimated that the perinatal mortality rates of counties and larger cities may have been altered, as one would logically suppose to be possible, by modification of factors other than chance. Perhaps, as was the hope when the program was announced, keeping local physicians acquainted with the results of maternity care for residents of their own counties and cities can help to bring about reduction of high perinatal mortality rates.

Table D

Most of the small number of counties and cities listed in Table D had rates not far from the state averages either before or after shifting from one to the other side of those averages between the years of 1967 and 1968. Again, nearly all localities demonstrated trend lines—downward in the left-hand column, upward in the right. In several instances, the increases in the nonwhite rates for the last two periods, although continuing on the same side of the stage average, were greater than the ones which took place between 1967 and 1968. In these instances the trend of the previous five-year period persisted, but whether because of chance alone or some other modification, to an exaggerated degree.

Table E

The surprising thing is that so few localities changed their relationship to the state averages in any two consecutive periods. With only one exception, the variations were small. The tendency toward continuity of rates of this sort is apparent.

The "Twelve-month Running Means"

The "12-month running means" were published monthly so that the local physician could continually compare the results of the maternity care rendered in his county or city with those of other localities. Kept current on a chart, the figures become of intriguing interest. They can also reliably be the "tip-off" to tentative concern.

The standing in comparison to the record of previous years, the monthly status in relation to the state average, the consistent trend lines, and the continuity as well as the magnitude of changes in the direction of trends are significant characteristics that

should be recognized.

The bewildering feature is the size and frequency of the fluctuations, manifestations usually, no doubt, of the as yet uncounterbalanced effects of chance on the rates for single years of the sizes that are dealt with here.

Fluctuations of "usual" proportions, however, do not seem so disturbing when it is kept in mind that variations of as much as 20 per thousand imply differences of only two, more or less, perinatal deaths in each consecutive 100 deliveries. The rough proportions of monthly white rates which over 15 months did not vary by more than that amount were: one-third for localities with between 101 and 250 annual deliveries, one-half for those with 251 to 500 deliveries, well over three-fourths for series of between 501 and 1,000 births, and essentially 100% for the still larger series. In fact nearly three out of four of the localities with more than 1,000 white births a year varied throughout the 15-month period by less than one perinatal death per 1,000 live births (10 per thousand).

The program under review makes available for study nearly 3,000 differences between rates of consecutive months. In the left-hand columns of Table 7 it can be seen that month to month variations of 10 and more per thousand for white and nonwhite rates respectively, in counties and cities with from 101 to 250 annual births occurred in something less than 10%. The magnitude of the variations fell to ±3 for white rates and ±4.5 for nonwhite rates in localities with more than 1,000 race specific births per year. Similar figures at about the 10% level for the intermediate groupings, respectively, for white and nonwhite rates were ±6 and ±9 for series of 251 to 500 births. and ±4.5 and ±7 for those with 501 to 1,000 annual births.

Those month to month fluctuations, it is suspected, will seem surprisingly small to most physicians. Changes in rates as great as those shown in Table 6 for the roughly top 10%, however, should suggest that something other than chance may have been altered.

Since the deaths of a particularly "good month" or "bad month" will continue to be counted in the calculations for the next 11 reports, it becomes important to follow the continuity of the rates. The program has not gone on long enough to tell what the frequency, if any, might be of long-term cycles, over periods of two or more years which, for the above reason, could be attributed to chance.

In order to check on the frequency of large variations over the first 15 months of the program, the highest and the lowest rates recorded for each locality were tabulated and the span of this maximum difference was calculated. Distributed among the four groupings by size of series for each race, the numbers are too few as yet to support anything but very tentative estimates of the spans which, over a period of months, could be considered great enough to suggest that causes other than chance might reasonably be suspected. They make up the right-hand columns of Table 7.

Maximum differences, or spans of 40 to 60 per thousand, occurred respectively for white and nonwhite rates in something over 5% of the localities with between 101 and 250 annual births. With differences of 15 and 20 respectively, the frequency among white and nonwhite births in annual series of over 1,000 was 4.3% and 13%.

Over a period of 15 months, anything much less than "high-low" spans of 15 to 40 for white rates and 20 to 60 for nonwhite rates, depending on the size of the series, could hardly be considered cause for serious concern.

Still, the continuity of trend lines has to be taken seriously. A number of these were quite marked. They are not listed here because they so nearly correspond with the changes which occurred in the rates for 1968-1969 which have already been discussed.

Equally interesting to follow are the abrupt changes in trend direction. Continuation of such changes may become significant. A number went on long enough to make one wonder if something more permanent and other than chance might be involved.

TABLE C

RESIDENT PERINATAL MORTALITY RATES
COUNTIES & 36 LARGEST CITIES of NORTH CAROLINA
7 YEARS

Rates which dropped from above or rose from below State averages in 1963-7, and 1964-8, respectively to below and above the State averages for 1968-9: dash indicates interval of change in relationship to State average: in ascending order (left) and descending order (right) of the perinatal mortality rates for the period 1968-9

At and Below State Averages for 1968-9			WHITE		Above State Averages for 1968-9			WHITE	
	PERIOD					PERIOD			
Area	1968-9	1964-1968**		1963-7	Area	1968-9	1964-1968**		1963-1967
Entire State	28.4	(9833/336502)	29.2	29.4	Entire State	28.3	(9833/336502)	29.2	29.4
* COUNTIES					* COUNTIES				
v Chatham	15..1	-(48/1505)	31.9	32.8	Pender	50.6	-(17/783)	21.7	25.2
v Montgomery	19.4	-(42/1209)	34.7	39.0	∧ Martin	41.1	-(25/1078)	23.2	19.1
v Mitchell	21.3	-(41/1100)	37.3	38.1	Washington	38.5	-(16/708)	22.6	25.9
v Columbus	24.4	-(97/2944)	32.9	35.7	∧ Anson	37.4	-(21/909)	23.1	21.9
v Swain	24.5	-(18/605)	29.8	31.6	∧ Transylvania	36.2	-(44/1736)	25.0	24.2
v Brunswick	25.0	-(42/1312)	32.0	35.5	∧ Sampson	33.8	-(67/2350)	28.5	28.3
Catawba	25.3	-(277/7372)	30.8	30.7	Iredell	32.3	-(136/5098)	26.7	27.2
v Edgecombe	27.1	-(72/2181)	33.0	36.8	Vance	32.1	-(43/1502)	28.6	29.2
Polk	28.3	-(37/767)	48.2	46.4	Guilford	31.6	-(528/18554)	28.5	28.5
CITIES					New Hanover	31.3	-(134/4993)	26.8	27.7
v Kinston	11.4	-(46/1420)	32.4	33.8	∧ Burke	30.3	-(116/4881)	23.8	23.4
v Lumberton	17.7	-(42/1205)	34.8	35.4	Bertie	29.6	-(16/629)	25.4	25.6
v Hickory	24.1	-(62/2067)	29.9	31.1	Davidson	29.3	-(209/7428)	28.1	28.6
v Lexington	26.0	-(43/1394)	30.8	36.5	∧ Macon	29.2	-(29/1082)	26.8	25.2
Raleigh	26.6	-(225/7100)	31.6	30.0	∧ Beaufort	28.9	-(47/1955)	24.0	19.4
Shelby	27.0	-(37/1189)	31.1	29.6	CITIES				
Roanoke Rapids	27.1	-(31/1000)	31.0	29.9	Thomasville	44.3	-(28/1122)	24.9	27.3
Lenoir	27.9	-(47/910)	51.6	51.1	∧ Henderson	39.2	-(19/691)	27.4	25.8
					∧ Statesville	33.6	-(43/1478)	29.0	28.3
					∧ Salisbury	28.9	-(30/1194)	25.1	24.0
NON-WHITE									
Entire State	49.4	(7923/153758)	51.5	52.2	Entire State	49.4	(7923/153758)	51.5	52.2
COUNTIES					COUNTIES				
v Union	33.2	-(101/1733)	58.3	64.6	∧ Rutherford	71.1	-(38/818)	46.5	40.9
v New Hanover	34.3	-(121/2262)	53.5	55.4	Sampson	68.5	-(104/2050)	50.7	50.9
Hoke	38.8	-(68/1135)	59.9	56.3	∧ Pasquotank	57.7	-(56/1166)	48.0	43.4
v Columbus	41.2	-(118/2183)	54.1	56.7	∧ Rockingham	53.7	-(90/2159)	41.7	39.5
v Harnett	42.3	-(106/1966)	53.9	62.3	Washington	52.7	-(27/875)	30.9	39.9
v Warren	42.4	-(75/1168)	64.2	67.7	Rowan	52.0	-(64/1590)	40.3	41.4
Davidson	44.6	-(79/1372)	57.6	56.8	∧ Lee	51.4	-(41/876)	46.8	39.1
v Wilson	46.3	-(177/3140)	56.4	59.0	∧ Cabarrus	50.5	-(75/1526)	49.1	45.5
Halifax	47.6	-(240/4201)	57.1	55.4	Cleveland	49.9	-(80/2393)	33.4	34.9
v Johnston	48.1	-(99/1787)	55.4	60.8	∧ Cumberland	49.5	-(350/7123)	49.1	47.5
CITIES					CITIES				
v Wilmington	33.4	-(105/1945)	53.9	57.1	∧ Hickory	63.6	-(19/470)	40.4	39.3
Thomasville	43.9	-(35/573)	60.9	55.7	∧ Goldsboro	63.0	-(83/1617)	51.3	48.1
v Greensboro	49.3	-(281/4737)	59.3	60.6	Salisbury	59.0	-(31/649)	47.7	50.0
					∧ Henderson	55.2	-(33/771)	42.8	41.5
					∧ Eliz. City	53.1	-(27/643)	41.9	37.6
					∧ Shelby	52.2	-(16/611)	26.1	23.4

* v indicates consistently downward trend
∧ indicates consistently upward trend
** 1964-1968 (deaths/deliveries) Rate

DETAILED EVALUATION AND CAREFUL INTERPRETATION ARE REQUESTED -
THE RAW DATA CANNOT BE TAKEN AT FACE VALUE

TABLE D

RESIDENT PERINATAL MORTALITY RATES
COUNTIES & 36 LARGEST CITIES OF NORTH CAROLINA
7 YEARS

Rates which dropped from Above or Rose from Below State Averages in 1963-1967 to Respectively Below and Above the State Averages for 1964-1968 and 1968-1969 in Ascending Order (Left) and Descending Order (right) of the Perinatal Mortality Rates for the Period 1968-1969

At and Below State Average for 1968-1969 and 1964-1968			WHITE		Above Stated Averages for 1964-1948 and 1968-1969			
	PERIOD					PERIOD		
Area	1968-9	1964-1968**		1963-1967	Area	1968-9	1964-1968**	1963-1967
Entire State	28.4	(9833/336502)	29.2	29.4	Entire State	28.4	(9833/336502)	29.2 29.4
* COUNTIES					* COUNTIES			
v Dare	11.5	(14/557)	25.1-31.6		Person	33.2	(46/1386)	33.2-29.3
v Nash	20.1	(75/2681)	28.0-29.7		∧ Haywood	34.3	(115/3869)	29.7-28.6
v Durham	23.2	(204/7100)	28.7-29.6		Alamance	29.5	(194/6508)	29.8-27.3
v Carteret	24.9	(64/2330)	27.5-32.9		Cleveland	28.6	(149/5076)	29.4-28.0
v Onslow	25.9	(332/11378)	29.2-30.0					
CITIES					CITIES			
v Rocky Mount	12.0	(50/1724)	29.0-36.7		None			
v Durham	20.5	(130/4511)	28.8-30.8					
NON-WHITE								
Entire State	49.4	(7923/153758)	51.5	52.2	Entire State	49.4	(7923/153758)	51.5-52.2
COUNTIES					COUNTIES			
Montgomery	39.3	(33/650)	58.8-54.0		∧ Hertford	80.6	(86/1569)	54.8-51.8
v Moore	40.1	(65/1357)	47.9-58.2		∧ Granville	66.7	(110/1883)	58.4-50.8
v Edgecombe	46.6	(178/3487)	51.0-55.9		∧ Martin	64.5	(82/1574)	52.1-49.2
CITIES					∧ Craven	61.7	(118/2178)	54.2-51.7
Durham	38.1	(187/3823)	48.9-53.7		∧ Richmond	58.2	(85/1595)	53.3-52.3
Burlington	48.0	(38/745)	51.0-54.1		Stanly	53.5	(36/627)	57.4-51.8
					∧ Wake	54.1	(323/6143)	52.6-52.0
					CITIES			
					∧ Lumberton	67.0	(51/944)	54.0-47-3
					∧ Concord	65.1	(29/559)	51.8-47.8
					∧ High Point	58.1	(111/2092)	53.0-50.9

* v indicates consistently downward trend
∧ indicates consistently upward trend
** 1964-1968 (deaths/deliveries) Rate

TABLE E

Rates which were neither above nor below State averages in any two consecutive periods: 1963-1967, 1964-1968, 1968-1969: dashes indicate intervals of change in relationship to State average.

WHITE					NON-WHITE			
Area	1968-9	1964-1968**	1963-1967	Area	1968-9	1964-1968**	1963-1967
Entire State	28.4	(983/336502)	29.2 29.4	Entire State	49.4	(73923/153758)	51.5 52.2
COUNTIES				COUNTIES			
Graham	22.7	-(19/625)	30.4-28.7	None			
Bladen	27.5	-(44/1355)	32.5-28.9				
CITIES				CITIES			
Burlington	25.8	-(86/2912)	29.5-26.5	Wilson	56.0	-(78/1518)	51.3-55.5
Greenville	30.6	-(41/1533)	26.7-31.3				

DETAILED EVALUATION AND CAREFUL INTERPRETATION ARE REQUIRED -
THE RAW DATA CANNOT BE TAKEN AT FACE VALUE

Perhaps the most surprising discovery of this study is that nearly half of the localities for which ratios for 1968-1969 were calculated had monthly rates that were above or below the state means for the same month in at least 13 of the first 15 reports. These are listed in Table F.

As would have been expected, the proportion of localities with consistent rates goes up as the size of the series increases. Still, one out of three of the counties and cities with 101 to 250 race specific births per year had such consistent "12-month running means."

As would also have been expected, the counties and cities with rates that were above or below the state averages in all three of the periods considered in this review and listed in Table B are more likely to have monthly reports that are similarly consistent. There was, nonetheless, substantial representation from Tables C and D. Evidently the rates of almost any series are capable of remaining below or above the state rates. This would be one of the more important observations.

Keeping track of these statistics, then, can become more than an interesting pastime. To the inquisitive physician it can be a source of satisfaction regarding his community, a challenge to his curiosity, or a cause of concern.

Generalizations

The primary purpose of this review was to supply physicians with meaningful statistics which apply to the counties and cities in which they are particularly interested, those which they themselves serve, and those with which they can compare their own localities. Working with these figures for the entire state does, however, turn up several general matters that call for speculation or comment.

The cities

While the four cities with more than 1,000 annual white births comprised the only group with perinatal mortality rates all below the state averages in 1968-1969, there were reasons for suspecting a more general problem in regard to maternity care for nonwhite residents of many urban centers. In at least five recent years the nonwhite perinatal loss rates of rural residents have been less than those for residents of communities of more than 2,000. Nearly twice as many cities with populations of 10,000 and more had provisional nonwhite perinatal mortality ratios for 1968-1969 that were above the state average as those with rates below it. Of the cities with nonwhite rates that were consistently below or above the state averages in each of the three periods (Table B), five were among the lower as opposed to eight of the higher, and the latter included some of the highest rates in the state. The differences, finally, between the white and nonwhite perinatal mortality rates for a number of the larger cities were a good deal greater than the race specific difference in the state as a whole. This was because in some the white rates were unusually low, in others the nonwhite rates were unusually high, and in a good many because both of those situations existed side by side.

If one were to put his finger on one problem that was common to any group of localities it would be that a preponderance of cities with populations of 10,000 and more share the characteristic of particularly or persistently high perinatal losses in their nonwhite populations although their white losses might be remarkably low.

Discrepancy between low and high rates

The wide discrepancy between low rates and high rates applied to both white and nonwhite populations and, with the exception of the four largest cities, to every grouping of counties and cities according to the annual number of deliveries. It applied to the rates from each of the five-year periods as well as to the provisional ratios for 1968-1969, and for those of every single year.

When, besides the size of the discrepancy between low rates and high rates, the duration of those differences in certain localities is considered, it seems a reasonable conclusion that the effects of causative factors other than chance alone are represented.

The fact that the differences between the low and the high rates are so nearly proportional for white and nonwhite—80% to 100% of the lower rate—makes one wonder if the causes of the discrepancy, whatever they are, could in some way be similar for the two races.

Consistency of low and high rates

One also wonders whether the evident tendency for low rates to remain low and high rates to remain high over periods of at least seven years could indicate that the causes of some of those low rates and some of those high rates might have continued to operate in the same respective localities year after year.

The trend lines

It was noted that a number of counties and cities had changes in rates of such magnitude, such consistency, and such evident persistence that they also are difficult to explain as simple effects of chance alone. The experience of those localities would seem to indicate that the level of perinatal losses in a community is not immutable; that it can be changed by modification of the influential factors other than chance.

The lack of common denominators

In searching for leads to identification of any other influential factors, there appears to be a remarkable lack of common denominators among those localities which demonstrated trend lines either downward or upward, but that lack is most obvious in those counties and cities with rates either below or above the state averages in all three periods (Table B).

On each side of Table B, distinguishing rates below from rates above those averages for the state as a whole, are represented localities from all parts of the state. The causes of low or high rates do not seem to have anything to do with geography nor, therefore, with gross population differences that might have regional distribution.

There does not seem to be any firm correlation with rural, urban or metropolitan residence. As has already been pointed out, except for white populations of the four largest cities, there are low and high perinatal loss rates for each race in each category of residence.

Also among the counties on each side of Table B are ones with high, intermediate, and low proportions of their populations having annual incomes under $3,000.[10] Yancey and Ashe can be paired, having white rates respectively below and above the state average, with 42% and 48% of their population in the low income bracket. Lee and Stanly can be similarly coupled, with 25% and 26% having low incomes, as can Randolph and Cabarrus, with 17% and 16%.

The same situation holds true in relation to the nonwhite statistics. Randolph, Chatham, and Bertie are counties with rates consistently below the state average; Forsyth, Iredell, and Beaufort above. The respective proportions of their populations with annual incomes under $3,000 are 17.3%, 28.3%, 44.7% for counties with the lower rates. They were 14.1%, 21.5%, and 41.5% for those with the higher rates.

To the extent that the proportion of people with incomes under $3,000 can be taken as a measure of the economic status of counties, there does not appear to be any correlation between that characteristic and the perinatal mortality of either race.

There is a correlation in two counties between large proportions of midwife deliveries among nonwhite residents and perninatal loss rates that were consistently above the state average. This has no real counterpart among those counties with rates consistently below the state average (Table B). The investigation relating proportions of midwife deliveries to nonwhite losses covered only 1966.[11]

In Franklin and Northampton counties, with nonwhite perinatal mortality rates consistently above the state average, midwives attended 43% and 56% of the nonwhite births. On the other hand, Pitt and Onslow counties, with the highest proportion of midwife deliveries among counties with rates consistently below the state averages, had only 10% and 13%.

It looks as though a high degree of midwife activity may contribute to nonwhite perinatal mortality, and yet there were counties with rates above and below the state averages in which midwives were still

TABLE F

RESIDENTIAL PERINATAL MORTALITY RATES

COUNTIES & 36 LARGEST CITIES OF NORTH CAROLINA

Monthly "Twelve Month Running Means"
Consistency of Relationship to State Averages
October 1968 to December 1969

Below State Averages WHITE		Above State Averages WHITE	
All Fifteen Months			
Counties	Cities	Counties	Cities
Chatham	Charlotte	Alexander	Asheville
Columbus	Durham	Buncombe	Concord
Dare	Kinston	Caldwell	Fayetteville
Jackson	Lumberton	Cumberland	High Point
Lee	Rocky Mount	Henderson	Monroe
Mecklenburg		Martin	Reidsville
Northampton		Pender	
Nash		Richmond	
Pasquotank		Stanly	
Wake		Stokes	
Wayne		Transylvania	
		Watauga	
Fourteen of Fifteen Months			
Halifax		Anson	
Mitchell		Guilford	
Montgomery		Haywood	
Onslow		Johnston	
Rowan		Sampson	
Thirteen of Fifteen Months			
Craven	Raleigh	Ashe	Thomasville
Duplin	Winston Salem	Caswell	
Lenoir		Iredell	
Randolph		Union	
Wilson			

NON-WHITE		NON-WHITE	
All Fifteen Months			
Counties	Cities	Counties	Cities
Chatham	Durham	Forsyth	Goldsboro
Durham	Greenville	Hertford	Lumberton
New Hanover	Reidsville	Rutherford	Raleigh
Randolph	Wilmington	Wayne	Statesville
Robeson			Winston Salem
Union			
Fourteen of Fifteen Months			
Buncombe		Guilford	Henderson
Catawba		Iredell	New Bern
Harnett		Richmond	Rocky Mount
Mecklenburg		Wake	
Pender			
Thirteen of Fifteen Months			
Columbus	Asheville	Franklin	Salisbury
Duplin	Charlotte	Martin	Wilson
Montgomery		Sampson	
Moore			
Orange			
Pitt			
Wilson			

TABLE 7

FLUCTUATIONS IN MONTHLY "TWELVE MONTH RUNNING MEANS" FOR PERINATAL MORTALITY AMONG RESIDENTS OF NORTH CAROLINA COUNTIES & 36 LARGEST CITIES

Size of Series	Month to Month Fluctuations*		Maximum Differences in fifteen months **	
	White	Non-White	White	Non-White
101-250	± 10	± 12	40 or more	60 or more
Counties	29/308	29/308	2/22	1/22
Cities	17/210	23/224	0/15	1/16
Total	(46/518) 9%	(52/532) 10%	(2/37) 5.4%	(2/38) 5.3%
251-500	± 6	± 9	30 or more	40 or more
Counties	34/336	35/402	2/24	2/28
Cities	17/140	7/70	0/10	1/5
Total	(51/476) 11%	(42/472) 9%	(2/34) 5.9%	(3/33) 9%
501-1,000	± 4.5	± 7	20 or more	30 or more
Counties	30/322	7/98	4/23	0/7
Cities	7/98	6/56	0/7	0/4
Total	(37/420) 9%	(13/154) 9%	(4/30) 13.3%	(0/11) 0.0%
1,001 plus	± 3	± 4/5	15 or more	20 or more
Counties	31/266	8/84	0/19	1/6
Cities	5/56	2/28	1/4	0/2
Total	(36/322) 11%	(10/112) 9%	(1/23) 4.3%	(1/8) 12.5%

* For each size of series, ± figure at the top indicates the month to month fluctuations which roughly 90% of those total fluctuations did not exceed; roughly 10% did. Numerators show the number of monthly fluctuations which did exceed the ± figure above; denominators indicate total number of fluctuations for that size of series; % rate indicates proportion of fluctuations exceeding ± number at top.

** For each size of series: the number at the top indicates that magnitude of the difference, over the fifteen months, between the lowest and the highest reported rates, which was not exceeded in the proportion of series shown by the percentage rate below.

Numerators show the number of series with high-low spans in excess of the number shown above; denominators indicate the total number of series in the size of series category; % rate shows proportion of spans exceeding the number at top.

working and numerous others where no midwives have operated for some time. Washington County (Table C), is a glaring example. In 1966 it had the highest proportion of midwife deliveries—66% of nonwhite births—of any county in the state and at the same time the lowest perinatal loss rates of those counties which had had 100 or more nonwhite births in that year. That its low mortality record—12.7 per thousand—was not all the result of chance but might reflect the capability of those particular midwives and the degree of physician supervision is suggested by the fact that nonwhite perinatal mortality rates for that county had also been below the state averages in 1964 and 1965 as they were again in 1967. Over those years, moreover, fetal deaths made up a preponderance of the perinatal mortality.

In this question about the influence of midwife activity on a county's perinatal mortality rates, it seems again that some local peculiarity is implicated.

Some local peculiarity

The foregoing statement has already been made in connection with the size of the hospitals in counties and cities. That this conclusion applies at least tentatively to the level of perinatal mortality rates in general gets strong support from the evident lack of correlating common demoninators.

The Physicians' Point of View

Emphasis on the individual locality brings the subject back to the inescapable dependence of this program on the private practitioner—for evaluation, interpretation, and any effort at reducing locally high perinatal mortality rates.

Probably the most important aspect is the interest of the local physician and his acceptance of an obligation to his community. That this also has to be an individual matter, perhaps rather a personal matter, seems clear when the situation is considered from a background of private practice. Several features inherent in such a practice tend to interfere with that interest and acceptance.

The individual practitioner has to believe that, under the circumstances, the care which he gives is in every instance as competent as anyone else could give. Few physicians could otherwise live with their consciences. Assuming the same for his confreres, there naturally seems to be little point to statisticial recording of results.

To take the best possible care of his own "private" patients is ideally conscientious, and the practitioner's not infrequent attitude that this fulfills his responsibility is laudably unprententious and certainly unofficious.

It would seem unreasonable to expect a private practitioner, regardless of the money involved, to undertake the care of indigents, for instance, when he is already looking after as many of his actual or potential friends and neighbors as he possibly can.

There will be some practicing physicians who, priding themselves on the individual care which they give their private patients, feel that the production line approach of so many "free" clinics is a compromise with quality which they do not care to make.

The concept that the doctor takes sick people as they come to him and is not obliged to try to change "human nature" may have roots in the humility that comes with experience.

Unfortunately all these attitudes are subject to exploitation, or the suspicion of exploitation, as sentimental alibis. Each does, however, carry the potentiality of an incontrovertible truth. Every physician has to decide how applicable they really are to himself.

It must be as a result of that decision, consciously or unconsciously made, that many local practitioners are curious about the "uncorrected" perinatal loss rates of their counties and cities. There are many who would be genuinely concerned with the standing of their own communities relative to that of others and of the state as whole if they felt that the criteria of comparison were reasonably reliable. The number of physicians who do contribute to the maintenance of local medical standards and the care of people who cannot pay would probably be surprising in any other profession.

It is hoped, therefore, that this review and the presentation of the seven years' background will help to offset the practitioner's not unfounded suspicion of statistics, will convince him that the figures published monthly in this program can be meaningful, and persuade him that some of those reports should get his earnest attention and stimulate him to cooperate, where losses are high, in efforts to reduce his community's rates.

Summary and Conclusions

A seven-year review of perinatal mortality in North Carolina counties and cities with populations of 10,000 and more is presented, with regard to the magnitude of the local rates, their consistency, their relationship to the state averages, and their demonstrated "trend lines."

Various extraneous factors which did influence or might have influenced the statistics, their interpretation, or their value are discussed and illustrated.

With that review as a background, some meaningful features were described of the "12-month running means" for race specific perinatal mortality which have been published monthly in the *North Carolina Medical Journal* since the first issue of 1969.

Several of the general problems which the statistics suggest were briefly considered. The most significant and firmest of the tentative conclusions are:

That the perinatal mortality rates of small numbers of counties and cities were low enough and high enough or were consistently low or high over a long enough period of time to imply that the differences probably represented the effect of potentially modifiable factors other than chance for both white and nonwhite populations.

That the rates of another small number of localities rose or fell so consistently and to such degrees over the three periods of time that were reviewed here as to throw serious doubt on the idea that those changes could reflect the influence of chance alone. Examples of both races are involved.

That there was, on the one hand, a tendency for counties and cities with low rates in one of the time periods to have rates below the state averages in the other periods, and for those with high rates in one period to have rates above the state averages in the other two. Those localities which did show constant "trend lines," on the other hand, demonstrated that there is nothing inescapably fixed or preordained about the level of perinatal mortality in a given community. The rates can apparently be altered, and again regardless of race.

That the only similarities to be noted among any groups of localities were the smaller losses in rural populations, both white and nonwhite, in the state as a whole and often in individual counties; the uniformly lower rates for white residents of the four cities with more than a thousand white deliveries a year; and the higher rates for the nonwhite residents of a preponderant number of the larger cities.

That unless some common denominator escaped notice, the only suggestive association with consistently low and consistently high rates or, for that matter, with the more markedly changing rates seemed, by exclusion of other generally influential factors, to be some peculiarity or combination of peculiarities of the local situation.

That the evident distinctiveness of the local situation in determining the level of perinatal mortality rates reaffirms the unavoidable involvement of the practicing physician in the maintenance of standards for his own county and city. In this function, surveillance of the rates reported monthly in the *North Carolina Medical Journal* can, with the record of previous years in mind, reassure him that those standards are being met, warn him of a developing problem or, properly evaluated, supply him with an objective gauge for the results of any particular effort to reduce the local losses.

Though not infallible, the rates will, over a period of months, serve those purposes adequately. Significance must be attached to their consistency below or above the current state averages and particularly to continuous trends predominantly downward or upward. Based on the experience of the first 15 reports, the monthly fluctuations (on the left) and over periods of 12 to 15 months (on the right) can be considered tentative causes for concern when, for series with the differing numbers of total annual births, they are

of or exceed the plus or minus magnitudes shown in Table 8.

Table 8

Critical Size of Fluctuations in Monthly Perinatal Mortality Means for Counties and Larger Cities of North Carolina

Total No. of Annual Births†	Month to Month White	Month to Month Nonwhite	Variations in Rates/1,000* White	Variations in Rates/1,000* Nonwhite
101-250	±10	±12	40 or more	60 or more
251-500	± 6	± 9	30 or more	40 or more
501-1,000	± 4.5	± 7	20 or more	30 or more
1,001 plus	± 3	± 4.5	15 or more	20 or more

*Until more data become accumulated, these figures are gross approximations.

†The figures apply to the median of each size group. For any particular locality, they would approach those of the next smaller or larger group as the number of its total annual births approached the lower or upper limits of its own group.

Consecutive local rates are most readily followed if kept current in a chart of successive months along with the rates for the state as a whole and other more or less similar counties and cities with which continuous comparison might be interesting.

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The State Of Franklin: A Physician Opinion Survey

SOME FACTORS THAT CAUSE PHYSICIANS TO SETTLE IN REMOTE AREAS

HUGH A. MATTHEWS, M.D.

In January, 1970 the State of Franklin Academy of Medicine and the State of Franklin Health Council set out to find ways to recruit physicians for the seven most southwestern counties of North Carolina. This mountainous region has a population of 110,000 persons dispersed over approximately 3,000 square miles. The ratio of active physicians to population is lower not only than that of North Carolina as a whole, but also of any other region of like population in all Appalachia. The 64 physicians in the area are significantly older than the state and national average, and many physicians practice very little or are retired. With the limitation of physician

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manpower is a corresponding deficiency of other health personnel. The organization of physicians and the official comprehensive health planning body of this region have entered into a cooperative relationship in attempting to relieve the manpower shortage.

In the fall of 1970 a questionnaire was mailed to every physician in the area. The objective was to find out why these physicians elected to invest their lives in this deprived tourist paradise. The thinking was

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that the factors which influenced them to locate here might well be attractive to new ones.

Thirty-two of the 64 physicians returned the questionnaire. While the ages of the respondees were not obtained, it is known from personal acquaintance that (1) no retired person responded, and (2) that the age span of the physicians who did respond was quite comparable to those who did not. The results are shown in the table.

Geographic assets

All but one of the responding physicians had been attracted to the area by the mountains and valleys, lakes and streams, and the cool summer nights and relatively short, mild winters. One physician, originally from the Chicago area, commented, "Where else can you ski on the mountains and return to make home calls without chains?"

Perhaps this and other depressed areas with geographic assets might well find ways and means to bring prospective physicians to the region during all seasons, if possible. State and federal institutions and agencies that are truly interested in Appalachia might do more to assist concerned deliverers and consumers of health services in bringing medical students, interns, and residents to the State of Franklin. This feature of the survey should point out a fruitful avenue for concerned citizens to explore.

Being born or raised in the area

Perhaps significantly, eight physicians indicated that spending their formative years in the region influenced their return to it. Since only half of the physicians participated in the study, this is surprising. To know how many of the doctors were either born and reared in the area, or both, would be helpful. A reasonable conclusion is that, even in this area where the young move out, the native physicians tend to return.

If so, the phenomenon has significance for future planning. Each regional physician might well identify and champion, from time to time, a prospective medical student in his practice catchment. The truly concerned schools might give priority to students from depressed areas and state, federal, and foundation aid for these students might well be increased.

Family connections

Apparently, family connections in the region are a significant factor in bringing physicians to the State of Franklin. Twelve respondents gave this answer. Eight of these did not register early childhood associations as a factor. Perhaps family connections brought the prospective physician to the State of Franklin and the area sold itself.

Regardless, the home folks in this area, and perhaps other areas, are a possible resource in physician recruitment. Local residents who are related to medical students or physicians elsewhere might be helped in introducing them to medical needs and prospects and the advantages of the region. Other medical societies and health planning groups might explore ways and means of developing this possible resource.

Economic factors

Not surprisingly, only five of the respondents gave the economic status of the region as a positive factor in bringing them here. Twenty-five indicated that it had no influence at all. In this depressed area, only one county in the seven has a per capita income comparable to that of the state as a whole. Doubtless many physicians who were otherwise attracted to the State of Franklin declined to settle here because of the poor economic conditions. Still, the survey indicated that high income is not a *sine qua non* in physician recruitment.

Two comments may reflect the consensus of those who did elect to invest their lives in these hills. One physician wrote, "You can make as much as the income tax will allow here as elsewhere." He added, "You can do exciting medicine here too, without the pressure of competition, and receive some apples and appreciation to boot."

In any case, some physicians, past and present were confident that they would be sufficiently compensated for their labors to warrant casting their lot here. Physicians and planners may tell it like it is without apprehension, even in Appalachia.