A TRIBAL EDUCATIONAL PLANNING

AND INFORMATION SYSTEM

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CHAPTER I

THE RESEARCH PROBLEM

Introduction

The educational state of Indian people is a matter of vital concern in contemporary America. As with other American minorities, there is increasing professional awareness concerning the existence of Indian social problems such as lack of education, lack of quantitative information regarding Indian education and the lack of adequately trained tribal planners. Accompanying this is a growing expectation among Indian people that government will do more about educational problems than simply issue formal expressions of concern and offering ineffectual remedial programs. For example, there is somewhat of a shift away from physical and economic development (e.g., roads, bridges, factories, etc.) towards more social matters (such as educational planning) as a central area of tribal concern.[1]

This is the general context of the line of research developed in this report. It is concerned with developing an understandable, effective and reliable Tribal Educational Planning and Information System (hereinafter referred to as TEPIS), a matter that tends to be neglected

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[1]Hearing Before the Subcommittee on Indian Education of the U. S. Committee on Indian Education of the U. S. Senate Committee on Labor and Public Welfare, Ninety-first Congress. First Session. Part One, 1969.

where tribal populations are viewed, for planning purposes as a single entity. Because unorganized, quantitative data pertaining to Indian educational characteristics is sometimes difficult for tribal decision-makers to understand, data organized for systematic statistical analysis and cartographic production enhances not only the quality of the resultant analysis, but also informational output as well.

When tribal staff can develop unorganized educational data into a computer generated graphic and statistical planning information system, areal problems and relationships that were not understood in tabular form become more readily recognizable. As such, more efficient and flexible data structures are then created.[2]

The use of graphics to convey complicated research conclusions is instrumental in the development of TEPIS. The concept of using graphics in the system began as an effort to readily explain and make usable sophisticated information to an organizational staff that was relatively unsophisticated in its ability to decipher technical materials. Consequently, graphics were chosen to assist tribal staff in processing and presenting statistical data, and to apply these skills and additional insights into tribal educational planning.

A graphics-oriented statistical system allows the planner to understand and maintain the information given.[3] TEPIS graphics enable the viewer to see positive and negative relationships between two or more

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[2]Wilbur G. Dement, Jr., "Indian Education: Where and Whether?" American Education, Vol. 28, No. 7 (1976), pp. 6-7.

[3]Harland Padfield and John Van Willigen, "Work and Income Patterns in a Traditional Population: The Papago of Arizona," Human Organization, Vol. 28, No. 3 (Fall, 1969), p. 208.

demographic variables such as education and Indian blood level. The individual tribal planner is able to quickly visualize the meaning of complex relationships because vision as a sense has the greatest capacity for understanding these relationships.[4]

Statement of the Problem

In social statistics pertaining to Indian people, the emphasis is placed on particular geographical jurisdictions such as counties and states rather than tribal areas. It is the national or state wide incidence of Indian educational problems that receives the attention of Federal and State decision makers in allocating educational resources to tribes, not the tribes themselves. Relying primarily on information produced by the United States Bureau of Census, Indian educational and ethnic statistics become diluted by the sheer mass of data pertaining to the majority of a jurisdictional population (e.g., municipality, county, state, etc.).

Traditionally, the "pin map" or "dot map" has been used by tribal staff to graphically depict the spatial structure of tribal educational achievement levels. Due to the amount of time involved, no systematic analysis could be performed on this data except determination of frequency distributions and ratios.

There currently exists no on-going system within the Creek Nation which provides for computer-based processing, mapping, and statistical analysis of data for tribal educational planning. Since such a system does not exist, in the opinion of the tribal staff, there are significant

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[4]Herbert W. Franke, Computer Graphics, Computer Art (London, 1971), p. 144.

disparities in the delivery of tribal educational services due to the lack of precise information pertaining to the location, number of potential program recipients and accurate assessment of specific educational needs of tribal members.

There is a lack of adequate information and planning methodologies on statistical and geographical variations on Indian education and related ethnicity within the Creek Nation tribal jurisdiction (Figure 1). Historically, tribal administrations have given scant attention to statistical and geographical variations in educational achievement primarily as a result of a lack of a reliable and understandable information base.

Purpose

The principal purpose of this dissertation is to determine the feasibility of using the computer based synagraphic mapping program (SYMAP), and the Statistical Package for the Social Sciences (SPSS) in formulating an efficient and accurate information system (TEPIS) which Creek tribal staff could implement and use in planning for more effective and precise delivery of educational programs within the geographic confines of the Creek Nation tribal area (Figure 1). Two variables were selected as test components in applying a computer based educational planning information system: (1) educational level (expressed in number of school years completed for both the mother and father); (2) Indian ancestry or blood level (degree of racial linkage as evidenced by amount of Indian blood of biological family), of both the mother and father. SYMAP will provide a visual comparison of density levels of parental Indian blood level and education, whereas SPSS

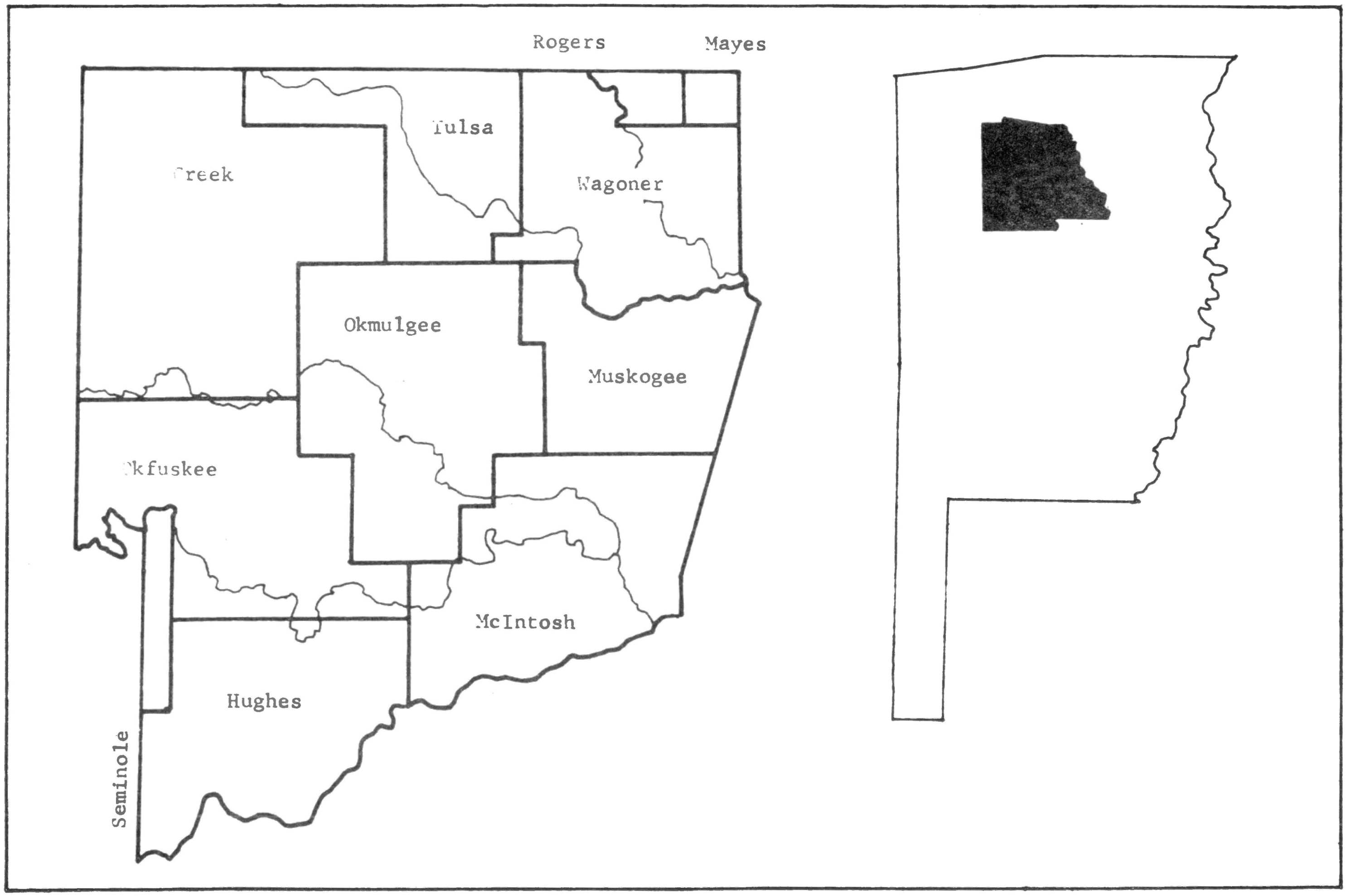

Figure 1. Creek Nation of Oklahoma Tribal Boundaries

provides a statistical analysis of the relationship. Further, TEPIS seeks to test the feasibility of applying SPSS through obtaining frequency values in a Chi-square matrix and mapping parental data values for each household using SYMAP. Thus, TEPIS is a means of presenting planning data in two complementary forms: (1) a numerical aggregated display and (2) individual data items through geographic mapping of values for each sample household. The null hypothesis used in this test: "There is no significant difference between Indian blood level (ancestry) by education of Creek parents," focuses mainly on the statistical and spatial aspects of Creek parents and the consequences of location.

The application of TEPIS can have four important benefits for tribal planning. First, TEPIS develops a planning information system dealing specifically with tribal educational characteristics. This system would also be applicable in identifying other information needs useful in the planning of other services as indicated by various social and economic indicators relating to Indian people. For example, these indicators may include, but not be limited to, factors important to tribal social service program development such as client income, age, and occupation.

Secondly, recognizing that there may be degrees of educational disadvantage within a tribe, this educational planning system would be designed to assist in recognizing those individuals who are most disadvantaged. Thus, a third purpose would be to develop a usable education planning information system that could both quantitatively and visually identify educationally disadvantaged tribal members.

A fourth application would be to identify through the system a tribal educational problem by applying TEPIS to two variables that would serve as test components: parental Indian blood level and education. As such, the system is designed to identify tribal members who are close to Indian culture by virtue of ancestry evidenced by Indian blood level (e.g. an individual with one-half Creek blood has one parent who is a full-blood Creek and one parent who is Caucasian).

Significance of Study

The significance of this investigation lies primarily with the concept of developing a feasible quantitative information system useful and usable in Indian education planning. Although this study focuses only on the Creek Nation of Oklahoma, the TEPIS planning system developed herein would be available and applicable to other tribal agencies as well. There currently exists no developed operational system for computer-based processing and mapping of educational data within any tribe in Oklahoma.[5]

This deficiency, however, is not confined to Indian tribal education planners. No institution of higher or secondary education in Oklahoma now employs both a computer-based statistical and geographical analysis system conjointly for purposes of institutional research and planning.[6] Thus, in testing the feasibility of SPSS and SYMAP relative to the Creek Nation, a system could be developed that would not only

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[5] Field Interview, Bureau of Indian Affairs and Office of Native American Planning Officials (Oklahoma State University, July, 1975).

[6] Interview, Director of Research, Oklahoma State Regents for Higher Education (Oklahoma City, March, 1975).

have significance as a planning tool for Indian education but potentially for secondary and higher education as well.

Background

The concept of the Tribal Educational Planning Information System (TEPIS) came as an outgrowth of the Creek tribal survey of 1975. Tribal staff implemented the survey in order to precisely measure and develop a social and economic profile of the Creek Nation.

At the conclusion of the survey, large amounts of data were generated in quantitative form. No graphics were used in the output. Extensive administrative processing and summarizing precluded effective dissemination of the resultant output. The tribal government was limited by few staff members skilled in evaluation of statistical information. Consequently, little output reached various tribal departments and staff for appropriate decision-making.

Staff resistance regarding the implementation of the 1975 survey was predictable, but again precluded the use of the data. Resistance to survey output was frequently verbalized with statements such as "I don't understand what this means," or "How can I present this 'stuff' at tribal meetings without investing a large amount of time in simplifying it?"[7]

In addition to the staff's quandry regarding processing and presenting the data, there was the more significant issue of applying the data in a constructive way to tribal education decision-making. Recognizing staff involvement as being critical to their acceptance and utilization

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[7]Field Interview, Creek Nation of Oklahoma Tribal Administration (Okmulgee, April, 1975).

of the survey material, a participatory decision-making process was used in determining what it was the tribal staff wished to derive from their data in order to implement and evaluate an educational program based on the survey.

Through this decision-making process, four major areas were selected as staff data needs in educational planning if an information system were to be established. These areas are discussed below. It should first answer the basic question of the needs for services by identifying those educational deficits and/or needs of tribal members. Secondly, the worthwhileness of projects and an information system should be easily evaluated if the needs for services are identified. Third, the level of effort required to plan an educational program should be easily assessed, in part again by the indication of amount of need and interest by tribal members. In the future, there should be a method(s) of assessing the effectiveness of educational programs, again to some extent based on levels of change from originally expressed and identified needs and educational levels through the survey instrument. Fourth, the planning process through an information system should provide planning comprehensive with knowledge of quantitative aspects of a program (e.g., number of consumers served, number of tribal members in need of service, location of members in need, location of service delivery points, etc.).

It was imperative that TEPIS be compatible with available tribal resources, including time required of staff, level of staff expertise required, the ability to be an on-going system, and available access to computer facilities contained in state universities. The primary goal established by tribal staff was to develop TEPIS in such a way as to output information highly usable to tribal decision-makers. The TEPIS would allow tribal staff to plan the most efficient and effective allocation of available resources in education service. Data would be recorded and revised to support administrative decisions for planning and operation. TEPIS accumulates, processes, and transmits timely data to relevant education program needs in both usable statistical and graphical form.

Limitations

There are four significant limitations noted in this study. First, implementation of TEPIS requires access to computer hardware facilities with comparable capacity to an IBM 370-135 computer. Secondly, TEPIS requires professional expertise in data collection, coding in a format compatible to SPSS and SYMAP, and analysis. Third, TEPIS requires a rather large initial investment of staff time in collecting raw data from field interviews, existing data files and other information sources. Fourth, TEPIS requires accessibility to both the SPSS and SYMAP computer programs.

Although use of TEPIS generated data has now moved beyond a feasibility test and is now being used by Creek Nation planning staff for documenting grant proposals for external funding, such use by the Creek Nation does not guarantee that other tribes would find such analysis acceptable or feasible for purposes of educational planning.

Definition of Terms

Choropleth Maps: Maps in which techniques of shading or coloring are used to build up a pattern of spatial variation between geographical areas (such as counties); and is well suited to the illustration of data which relate to areal units.

Contour Maps: Constructed so as to connect points of equal value, and the nature of the distribution is illustrated by the pattern of these lines on the finished map.[8]

Statistical Package of the Social Sciences (SPSS):

> Statistical Package of the Social Sciences (SPSS) is an integrated system of computer programs designed for the analysis of social sciences data. In addition to the usual descriptive statistics, SPSS contains procedures for simple correlation, means, variances, one-way and N-way analysis of variance, multiple regression, discriminant analysis, scatter grams, factor analysis and Guttman scaling. The data management facilities can be used to modify a file of data permanently can also be used in conjunction with any of the statistical procedures contained in the system.[9]

SYMAP:

> SYMAP is a computer mapping program using a standard line printer as its output device. The program was specifically designed to be used by planners and others who have an interest in analyzing spatial data. A SYMAP contour map [used in this study] displays data by interpolating a continuous surface in the regions where there are no data points, basing these interpolated values upon the distances to and the values of the neighboring data points.[10]

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[8]Peter Davis, Data Description and Presentation (London, 1974), pp. 70-77.

[9]Norman H. Nie et al., Statistical Package for the Social Sciences, 2nd ed. (New York, 1975), p. 1.

[10]James A. Dougenik and D. E. Sheehan, SYMAP User's Reference Manual (Cambridge, 1975), p. 1.

CHAPTER II

REVIEW OF THE LITERATURE

Indian Educational Planning

Need

Senator Walter Mondale in his statement before the Senate Subcommittee on Indian Education characterized the present educational system for the American Indian as inadequate. He stated,

> It is a responsibility for which almost exclusive blame rests with the Federal Government. This is the only educational system in the country which is a Federal system and I think it probably is the worst system in the country.[1]

The first major study on problems of Indian education was published by Lewis Meriam in 1929. Among its major findings, the Meriam Report noted that: (a) Indians were excluded from management of their own affairs; (b) Indians were receiving poor quality of educational services; (c) Indians were under an imposed educational system of another culture.[2]

Some 40 years after the publication of the Meriam Report, two significant studies on Indian education were completed: one by the Senate Subcommittee on Indian Education: A National Tragedy--A National

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[1]Hearing Before the Subcommittee on Indian Education of the U. S. Senate Committee on Labor and Public Welfare, 91st Congress. First Session, Part One, 1969.

[2]William G. Dement, Jr., "Indian Education: Where and Whether?" American Education, Vol. 12, No. 7 (1976), pp. 6-7.

Challenge; the second, written by Robert J. Havighurst and funded by a National Study of American Indians Grant, was the most comprehensive of its kind undertaken, involving more Indians and a greater geographical spread than any other study to date.[3] Their recommendations support the need for and demand of Indian control of educational planning and administration on a tribal basis.[4]

Precise data on economic and educational changes among American Indian populations are of vital importance to all concerned with their welfare, as well as to theorists interested in social change; but to date, valid statistics generally have been lacking.[5] This is due in part to the difficulty of defining tribal populations in a way that does not exclude members who are becoming assimilated into national society. Thus, tribal membership (such as in the Creek Nation of Oklahoma) must be defined on some basis other than social and cultural participation precisely so that educational variables may be measured and related to the system to which the members belong,[6] further indicating the need for tribal or area educational planning information systems.

Padfield and Willigen conclude that the reservation population under study (i.e., those close to Papago culture) tend to be economically marginal vis-a-vis the national economy, and the "Indian Problem" is

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[3]Ibid., p. 8.

[4]Ibid., p. 6.

[5]Harland Padfield and John Van Willigen, "Work and Income Patterns in a Transitional Population: The Papago of Arizona," Human Organization, Vol. 28, No. 3 (Fall, 1969), p. 209.

[6]Robert A. Hackenberg, "The Parameters of an Ethnic Group: A Method for Studying the Total Tribe," American Anthropologist, Vol. 69 (1967), p. 482.

indeed formidable when only Indians living on reservations are considered.[7] Although no reservations of similar nature now exist in Oklahoma, many Creek Nation tribal member concentrations do adhere to the historical boundaries defined by the official Creek Nation Tribal Map (Figure 1).

Computer Applications

More and more educational research and planning is now effected with data in machine readable format on punched cards, magnetic tapes and other such devices, with digital computers performing the numerous complex calculations upon this information.[8] As such, the speed and accuracy of the digital computer allows tribal educational planners to perceive geographically distributed phenomena in ways which have been heretofore not feasible because of cost and time limitations in performing cartographic computations by hand. Computers also can function in drawing maps on coordinate (X - Y) plotters, on cathode ray tubes, and on ordinary line printers of digital computers. Computers also significantly facilitate the processing and statistical analysis of large amounts of social and economic data.

An excellent example of the utilization of the line printer to make maps is the computer program SYMAP produced at the Laboratory of Computer Graphics and Spatial Analysis at Harvard University. This large FORTRAN (5000 cards +) computer program can produce approximations of both

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[7] Padfield and Willigen, p. 215.

[8] Morton W. Scripter, "Choropleth Maps on Small Digital Computers," Proceedings of the Association of American Geographers, No. 1 (1969), pp. 133-136.

choropleth and isopleth maps on the ordinary line printer of a computer while allowing the user of the program much flexibility in input and output specifications. It is now feasible to make a map of a distribution quickly and accurately with a variety of class limits, intervals, and symbols and also with a variety of numerical transformations upon the data. Moreover, it is also feasible to map hypothetical distributions derived from statistical or other numerical models, and to map the disparities (residuals) between the hypothetical and real distributions. Computer produced maps are potentially a useful method aiding basic and applied educational research, and serve as a logical extension and adjunct to the numerical analysis presently performed on digital computers.[9]

Review of the literature indicates that computer graphics and specifically the use of SYMAP, while used extensively in geography and city planning, has not been applied to the field of Indian or tribal educational planning. Given the extent of need for data in Indian education coupled with the need to present the data in a non-complex and understandable form for tribal decision makers, SYMAP appears to be a tool of useful import for the tribal educational planner.

James W. Cerny in his article "Use of the SYMAP Computer Mapping Program" notes that SYMAP is the most popular computer mapping program presently used by urban planners.[10] While complex, the system is

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[9]Interview, Creek Nation of Oklahoma Tribal Council (Okmulgee, July 18, 1975).

[10]James W. Cerny, "Use of the SYMAP Computer Mapping Program," <u>The Journal of Geography</u>, Vol. 3, No. 4 (1972), pp. 167-174.

extremely flexible, and once the fundamentals are grasped, usable for most planners.

SYMAP is especially meaningful because of its ability to produce both choropleth and isorithmic maps from regularly gridded and ungridded data. Once desired scale is adjusted for the map, all maps run thereafter are to the preferred scale.

Cerny notes that once the more difficult features of SYMAP are understood, SYMAP is enlightening to the planner. Its widespread use as a planning tool warrants the use of SYMAP as a computer mapping tool also.[11]

Computer mapping appears to be a useful tool that tribal education planners should note. After a lengthy search of the geographic periodicals, several computer assisted searches of ERIC (Education Research Information Center) documents, reports, journals, and reference books, there was found only one instance where SYMAP has been used for higher education planning and no instance of it being used in Indian education planning. In addition, no reference was found where SYMAP was used in conjunction with an integrated statistical analysis system of computer programs in tribal educational planning.

The one instance where SYMAP was used in general education planning is the Los Angeles Community College Data Project.[12] This project was designed to (a) provide the Los Angeles City Planning Department with

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[11] Ibid.

[12] A. N. Chudack and A. J. Landini, "Geosystems--A Means to Understanding Your Community." Paper presented at the California Junior College Association Research and Development Conference (Asiloma Conference Grounds, April, 1974).

a large sample for administering an annual census questionnaire, and (b) provide the Los Angeles Community College district with the necessary tools for understanding socio-economic characteristics and needs of its community and students. This second purpose resulted in computer generated SYMAPs that combine census data associated with a geographic region with individual student data from the Los Angeles Community College. An important conclusion of the aforementioned study was that social class is an important determinant of vocational choice and curriculum orientation.[13] Even when the United States economy prospers, pockets of poverty and other associated social problems flourish in the Indian community.

According to a recent Creek Nation tribal report (Office of Native American Planning), one out of every three Indian families living within the tribal area is in poverty. In central cities (the core areas of large metropolitan regions) it is thought to be much higher; among Blacks in central cities it is only one in four. Although educational disparities are not exclusively an Indian problem, concentration of Indians in Oklahoma tends to magnify their educational problems associated with poverty. By geographically identifying concentrations of Indians (or members of a particular tribe) and their socio-economic characteristics, tribal planners have a reliable framework within which to direct remedial education and other associated tribal programs.

The Indian institution best able, in terms of organization and philosophy, to effect an outreach education effort is the tribal

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[13] L. A. Glenny, "Trends are Impelling Higher Education Toward State and Regional Planning," College and University Business, Vol. 2 (1972), pp. 43-48.

government. But the preparation of the educationally neglected American Indian for the mainstream of community life has yet to become a major achievement of tribal governments in Oklahoma. According to tribal officials the principal reason for this is threefold: (a) tribal governments in Oklahoma do not have sufficient data describing the geographical distribution and concentrations of potential and qualified recipients of their services; (b) tribal governments generally lack necessary staff and research tools with which to engage in fundamental educational research; and (c) the need for tribal staff training to use SYMAP in combination with the Statistical Packzge for the Social Sciences (SPSS) would form a useful economical system with which effective educational research and planning activities could be conducted by Indian people for the purpose of selecting high priority target areas for remedial community education within their respective tribal areas.[14] Where SPSS would serve with an integrated system of computer programs for the statistical analysis of social science data, SYMAP would provide the capability to map distributions in order to make evaluations and visual correlations.[15] Such a useful combination seems feasible, but extensive literature review indicates no tribal government in the United States, much less Oklahoma, is using these tools to further educational research or to ascertain target areas within their sphere of influence for delivery of remedial or other community education programs.[16]

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[14] Interview, Creek Nation of Oklahoma Tribal Council (Okmulgee, July, 1975).

[15] Cerny, pp. 167-174.

[16] Interview, Creek Nation of Oklahoma Tribal Council (Okmulgee, July, 1975).

The treatment of basic literature relative to this proposal indicates the usefulness of both SPSS and SYMAP in exploring the spatial links between Indian educational achievement levels and other social and economic phenomena.[17] It is probable that the output from such a research system (SYMAP-SPSS) could provide valuable inputs into the educational planning process. Both SYMAP and SPSS with their capability to handle large amounts of data quickly and efficiently should go far in enabling any tribal government in generating effective educational planning and programming in order to realize desired goals. Thus, the rapid, accurate handling of large volumes of complex tribal data by SYMAP and SPSS will significantly improve methodologies now being used by tribal educational planners in Oklahoma in planning more effective educational systems, allocated to those geographical areas of greatest indicated need.

The recommended application of both SYMAP and SPSS to the educational planning process relative to Indian education, indicated by appropriate literature, is essentially seen as:

a. to provide background information in the determination of tribal educational goals,

b. to provide in-depth analysis in order to uncover specific educational problems facing Creek Indians,

c. to provide a useful quantitative framework for diagnosing tribal educational planning problems,

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[17] Jerry P. Schafer, "Computer Cartography and Professional Geographers," The Professional Geographer, Vol. 27, No. 3 (1975), pp. 335-340.

d. in establishing premises for educational program formulation and planning,

e. the search for alternative solutions relative to problems associated with the delivery of tribal educational programs, and

f. in the selection of particular solutions.[18]

Computer cartographers, through their unique skills associated with mapping techniques, have developed unique tools highly useful in organizations involved in planning. Schafer recommends SYMAP as a computer mapping tool that is flexible, accurate, and adaptable to many planning needs. SYMAP is especially useful in graphically revealing large concentrations of many socio-economic and demographic variables of interest today.[19]

In delineating those areas of the tribal region low in educational attainment and not now being adequately served by tribal or public education programs, a useful framework for educational planning is established. Mechanical obstacles to college entrance or community education will be more easily identified and removed. Further, a research focus combining both SYMAP and SPSS will enable Indian educational planners to better provide: (a) appropriate geographical proximity to community and higher education, and (b) plans for provision of financial assistance to potentially needy Indian students.

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[18]Carol H. Weiss, "Evaluation in Relation to Policy and Administration," in Gregory Kruse and Thomas Mullins, A Manual on the Basics of Mental Health--Related Evaluation (Chicago, 1976), pp. 348-353.

[19]Schafer, pp. 335-340.

The import of the literature for Indian education planners is clear, especially in the role of meeting both existing and anticipated deficiencies in both geographical coverage and special programming needs (e.g., adult education, remedial education, and technical training). The fact that income is being more and more determined by educational achievement indicates a pressing need to upgrade Indian education.[20]

Thus, one could conclude that a combination of planning tools focusing on both geographical and statistical analysis of Indian education serves (a) as a means by which individual tribes can more precisely identify their educational requirements and (b) as the basis by which other governmental organizations serving Indians can identify (statistically and geographically) unmet area needs and determine whether or not additional allocation of tribal resources for education are in order.[21]

Jenks and Coulson, in their article, "Class Intervals for Statistical Maps," speak of the usage of computer maps as a way of making understandable large amounts of data by simplifying and generalizing that data through the use of symbols.[22] These authors also note that significant geographic distributions are quite visible and understandable when each variation of a class interval is noted by a different pattern, thus emphasizing the differences and similarities in distribution.

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[20] Weiss, pp. 348-353.

[21] Ibid.

[22] George F. Jenks and Michael R. C. Coulson, "Class Intervals for Statistical Maps," The American Cartographer, Vol. 2, No. 1 (1975), p. 119.

The use of graphics in simplifying the decision-making process when dealing with large amounts of data is a method widely recognized within tthe field of communications. Herbert W. Franke notes that "man's visuall faculty surpasses all other senses in its capacity to discover relationships."[23] Consequently, graphics simplify the understanding of relationships, and within TEPIS, allow the essentially untrained (regarding statistics) to grasp significant data warranting inclusion as a segment of educational planning.

Monmonier advocates the use of computer mapping systems based on purposes that give the best areal representation of the data.[24] Further, statistical maps should be both clear and simple in message when viewed by the public. He notes that computer mapping becomes especially valuable with those maps in which there are distinct groupings of a particular variable under study. The use of computer mapping to relay statistical data is most helpful in the illustration of particular variables to the public.[24]

As discussed in Chapter I, Creek staff sought a system that would allow staff members who are relatively unsophisticated in methods and use of data information systems to rapidly assimilate important facts. Edward Hamilton, in Graphic Design for the Computer Age, maintains that "the language of graphics is a universally understood communication . . .

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[23]Herbert W. Franke, Computer Graphics, Computer Art (London, 1971), p. 50.

[24]Mark S. Monmonier, "Continguity-Biased Class Interval Selection: A Method for Simplifying Patterns on Statistical Maps," The Geographical Review, Vol. 62 (1972), pp. 206-227.

illustrations have a discursive quality, providing a profusion of facts simultaneously."[25]

[25] Edward A. Hamilton, Graphic Design for the Computer Age (New York, 1970), p. 15.

CHAPTER III

METHODOLOGY

Introduction

The object of this chapter is to delineate the various procedures and methodologies comprising the development of TEPIS. Although techniques such as graphs, maps, and variable crosstabulation are used primarily for descriptive analysis, the most significant component methodology of TEPIS is the combined application of two computer-based analysis systems: SYMAP and SPSS.

SPSS was chosen because it is an integrated system of computer programs designed for the analysis of social science data such as education and Indian blood levels. The system provides a unified and comprehensive package that enables the user to perform different types of data analysis in a simple and convenient manner. SPSS allows significant flexibility in the format of data. It provides the user with a comprehensive set of procedures for data transformation and offers the researcher a large number of statistical routines commonly used in the social sciences such as descriptive statistics, frequency distribution, and variable crosstabulations. SYMAP, however, is a computer mapping program using a standard line printer as its output device. The program was chosen because it is specifically designed to be used by planners, and others who have professional interest in analyzing spatial data. The program contains a flexible range of choices to control most aspects of data input and map output, such as scale, data interval level, and geographical area to be mapped.

The way in which tribal informational needs were defined determined much of the methodology which follows. In order that the proposed educational system be acceptable to administrative decision makers, tribal staff were included at each phase of not only research design, but data collection activity as well.

The methodological process in developing TEPIS is composed of the following set of tasks:

(A) Formulating the hypothesis

(B) Data collection

    (1) Choosing survey technique

    (2) Determining the sample

    (3) Defining variables

    (4) Conducting the survey

(C) Analyzing the data

    (1) Compiling and refining data collected

    (2) Statistical and cartographical methodology used in the development of TEPIS.

Hypothesis Formulation

The null hypothesis: "There is no significant difference between Indian blood level (ancestry) by educational level of Creek mothers or fathers" primarily focuses on the statistical and spatial aspects of Creek parents, their education, and the consequences of location. The hypothesis under question seeks to test methods allowing tribal planners to make comparisons between places and areas within the Creek Nation and to search for causal relationships between geographically distributed phenomena such as parental blood level and educational characteristics of Creek tribal members such as mothers and fathers.

If TEPIS is to be a valid and useful planning tool in more effectively identifying problems and delivering educational resources to tribal areas of greatest need, then the statistical and cartographical validity of the system must be tested. Selection of parental Indian blood level and education as test variables reflects an immediate concern of tribal decision makers for those individuals they consider close to tribal culture as defined by ancestry (i.e., one-quarter blood or more), and the need geographically to identify and isolate those areas within tribal boundaries where increased parental education would be necessary to assist in improving family economic status through enhanced employment opportunity, by raising educational levels.[1]

Although a total of 36 variables were included in the 1975 Creek Nation tribal survey (see Appendix A), parental education and Indian ancestry (blood level) reflect, in the opinion of tribal decision makers, an immediate interest regarding human development planning. However, due to the nature and structure of TEPIS, the successful treatment of two test variables would obviously indicate the feasibility of effecting a comprehensive statistical and cartographical analysis of the remaining questions. As such, the scope of the hypothesis is confined to analysis

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[1]Interview with James King, Director, and Planning Staff of the Creek Nation Division of Human Development (Okmulgee, February 10, 1975).

regarding development of statistical and cartographical methodologies pertinent to TEPIS.

Data Collection

Formulation of the Survey Instrument

Through a cooperative effort on the part of the planning officers of the Creek Nation, the author, and the staff of the OSU Office of Research and Projects, a survey instrument was developed to gather data and information perceived to be important for the various developmental and planning project needs in the Creek Nation. Although the instrument (see Appendix A) went through several revisions, the final document consisted of 36 items and used individual households as the basic unit of analysis. The author assumed provision was made on the survey instrument to identify the geographic location of the household by county, township, range, and section. These identifying variables made possible the cartographic analysis of the data through use of the SYMAP program.[2]

Sampling Technique

The Creek Nation of Oklahoma, formally known as the Muscogee Nation, I. T., consists geographically of all or parts of 11 counties of North Central Oklahoma (Figure 1). This includes all of Okfuskee, Okmulgee, and Creek Counties; parts of Wagoner, Muskogee, McIntosh, and Hughes Counties; a major geographical portion of Tulsa County; and small parts

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[2]Kenneth McKinley, James Martin and Burl Self, *Creek Nation Census: A Socio-Economic Survey of Selected Household and Individual Characteristics* (Oklahoma State University College of Education, 1976), p. 2.

of Rogers, Mayes, and Seminole Counties on the west. For purposes of this analysis, eight counties were selected as sampling points. These counties were: Creek, Hughes, part of Seminole, McIntosh, Muskogee, Okfuskee, Okmulgee, Tulsa, Wagoner, and parts of Rogers and Mayes.[3]

The sampling process was both systematic and random. The process was systematic in that every township within the boundaries of the Creek Nation was automatically included in the study.[4] It was random in that the selection of households for the purpose of administering the survey instrument was accomplished by randomly selecting geographic units (sections) within townships (Appendix B). This was done by generating, from a table of random numbers, a number from 1 to 36, each of which corresponded to all sections contained within a township.[5] The specific steps in the sampling technique at this strata included:

1. The selection of a number from 1 to 36 from any table of random numbers.
2. Determining from tribal census and map records the eligible households contained within the designated township.

Later in this study an example township is depicted showing the hypothetical location of the eligible households within a section of that township (see Appendix B).

Approximately 5,600 Creek Nation households in the population were identified from a master list which was developed by planners from the

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[3] Ibid., p. 3.

[4] Donald A. Krueckeberg and A. L. Silvers, Urban Planning Analysis: Methods and Models (New York, 1974), pp. 96-100.

[5] Taro Yamane, Statistics: An Introductory Analysis (2nd ed., New York, 1967), p. 581.

Creek Nation Division of Human Resources (James King, Director). At the point in the sampling process when the section number by township had been determined, more informal criteria were employed to guide the selection of households for inclusion in the study. These criteria included accessibility to interviewers, representativeness of the household to the study characteristics of that region, etc.[6]

An attempt was made initially to select one-third or 1,880 of the households in the Nation. This ultimately held true in all counties except that portion of Tulsa County included in the Creek Nation. Approximately 20 percent of the eligible households in Tulsa County were included in the present study. The following breakdown describes the results of the household sampling selection.[7]

Eligible parents:	
Mothers	1,076
Fathers	880
Eligible households:	5,664
One-third (1/3) sample:	1,888
Actual (final) sample:	1,700
Survey instruments returned by interviewers:	1,262
Usable returned:	1,225

Variable Selection

The two variables selected for testing the feasibility of TEPIS, education and Indian blood level, have a direct relationship to Creek Nation tribal goals. Tribal educational programs were viewed by Creek planners as one of the principal routes to high status occupations. Education could, in the opinion of tribal staff, do much to equalize

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[6] Interview with Creek Nation of Oklahoma Tribal Planning Staff (Okmulgee, April 10, 12, 13, 1975).

[7] Ibid.

Indian opportunity. Education is viewed as a means whereby initial advantages stemming from tribally financed educational programs are maintained for Creek families through parental participation. Evidently one way in which the tribe can assure improved Creek opportunity is to provide parents with improved and accessible educational opportunities. In this way, Creek planners feel that a more effective means can be provided by which successfully educated Creek parents may bequeath social and economic advantages to their children.[8]

Indian blood level allows tribal planners to identify Creek parents and target them for programs specifically designed to cope with Indian educational problems. Creek tribal planners fear that public school programs often seek to provide Indian clients with an educational experience designed to lessen in importance their Indian heritage. As such, in statistically and geographically identifying (by blood level) Creek parents, tribal planners hope to be better able to allocate Creek educational resources (staff, money, and facilities) to those areas exhibiting the most significant need rather than full reliance on the public school system. In identifying, measuring, analyzing, and depicting the degree of statistical and geographical association between education and Indian blood level, a more efficient tribal decision making system regarding the location-allocation of educational resources is thus achieved.[9]

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[8] James King, Personal Communication to the Principal Chief of the Creek Nation of Oklahoma-FC:400.D (06) (A), (Okmulgee, July 5, 1977).

[9] Interviews with the Creek Nation Tribal Planners, Division of Human Development (Okmulgee, April 10, 12, 13, 1975).

Conducting the Survey

Each interviewer was retained by the Creek Nation Department of Human Resources, based on the author's recommendation that these field investigators have the ability to closely relate to Indian culture. All interviewers were at least one-quarter Indian and actively voting members of the Creek Nation.[10]

The decision to use Indian personnel was based on assumptions that: (1) using Indian interviewers would lower the rejection rate, (2) information contained in the questionnaire (such as Indian blood levels) would require too much training for non-Indian personnel in order to effect an accurate interpretation of responses, (3) the use of bi-lingual field interviewers was necessary in order to elicit cooperation from more reluctant tribal members who, being very close to tribal culture, refuse to be interviewed except in their native tongue.[11]

Field monitoring and supervision of interview personnel was conducted by both the author and the staff of the Creek Nation Department of Human Resources. Each questionnaire (Appendix A) was checked for consistency and validity at three different levels. Level one included the field interviewer at the interview site; level two involved tribal staff members; and level three involved both the author and the staff of the Oklahoma State University Computer Center. All questionnaires found to have one or more inconsistencies were returned to the field for re-interview or rejected. Questionnaires returned in this manner were

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[10]Creek Nation Tribal Survey Training Seminar Interviews.

[11]Personal interview with James King.

accompanied by either the author or tribal staff to insure validity on the second interview. However, only some 37 questionnaires (out of a total of 1,262) were returned invalid.

Analyzing the Data

Compiling and Refining Data Collected

The questionnaire was formulated to facilitate automatic data processing using the IBM Model-29 keypunch machine and IBM Model 370-135 computer; the reason being the general availability of this equipment to tribal governments through the State University Extension systems. In designing the questionnaire, careful attention was given to not including open-ended or narrative type questions which would have precluded fast and efficient coding of responses for machine processing. All questions were non-attitudinal identification, of the fixed alternative type (Appendix A).[12]

Data were keypunched directly from questionnaires to IBM 80 x 80 cards. After keypunching, verification of data cards was accomplished by both the author and staff of the Oklahoma State University Computer Center.

Cartographical Methodology: The SYMAP Program

The SYMAP program is accessible to a wide audience (including tribal planners through the Oklahoma State University Extension Service) in post-secondary education through extensive documentation now available

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[12]Charles H. Backstrom, Survey Research (Chicago, 1963), pp. 70-84.

from the Laboratory for Computer Graphics and Spatial Analysis in the Graduate School of Design, Harvard University.[13] Hardware requirements for this large 5,000 cards plus FORTRAN computer program are well within the means of most computer centers containing a medium-sized computer (for example at least 225K) and a line printer. For centers with small memory computers, educational planners could explore the "scan line" approach developed by Scripter that uses an algorithm embodied in a FORTRAN program of 114 statements and a core space of 8K. Using card input for SYMAP, the generated maps display spatially dispersed data of variable darkness.[14]

The SYMAP program was the 1963 brainchild of Howard T. Fisher, a specialist in computer applications in urban analysis at Northwestern's Technological Institute. After initial application in business and successive program refinements aided by funds from the Ford Foundation, the program became the product of Harvard's Laboratory for Computer Graphics and Spatial Analysis under the directorship of Fisher.[15]

Although three basic mapping routines are available in SYMAP, only contour was considered applicable to this study. The others (Conformant, Proximal and Trend Surface) were not considered an appropriate application due to the nature of the data (i.e., continuous versus data allocated to specific predetermined geographical boundaries.)

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[13] James A. Dougenik and E. D. Sheehan, SYMAP User's Reference Manual (Cambridge, 1975), pp. ii-iii.

[14] Scripter, pp. 133-136.

[15] Dougenik and Sheehan, p. iii.

The conformant (or choropleth) map displays spatial data using predetermined boundaries specified by the user, such as maps which display a boundary between counties of a state. On the other hand, a contour (or isoline or isopleth) map consists of contour lines which connect all locations having the same data values. This is accomplished by interpolating a continuous surface in those areas not having data points and basing these interpolated values upon the values of and the distances to the other data points.

Trend surface analysis maps present a slight variation of the contour map. In this map a surface of a specified order is attached to values at given data points using polynomial approximations such as to minimize the deviations between the trend surface values and the given data values. As a further extension, SYMAP can also produce residual maps which express the difference between the standard interpolated surface SYMAP and the trend surface.[16]

The third broad type of map, the proximal map, is created by the nearest neighbor method by assigning to every location in the study area the value associated with the data point nearest that location. Boundaries are assumed where the values change. Data used in this option may produce output designed to measure degree of clustering. This option is also available in TEPIS as a further alternative to contour maps.

Although TEPIS would allow tribal planners to experiment with these alternative types of maps, the author chose the contour option as the principal cartographical component because, in part, the output

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[16] Ibid., Part II, p. 9.

is quantitative rather than qualitative in nature. Contour maps also allow the analyst to visually group data in identifiable clusters (e.g., a contour is defined as a line connecting points of equal numeric value).

The principal advantages of the contour map are that data relating to areas can be represented without the inclusion of area boundaries (precluding time consuming and expensive base map preparation), and that changes in variable value are shown to occur smoothly and continuously, rather than in abrupt steps, as with the Conformant option, thus facilitating interpretation. As a result, the Contour option is useful for illustrating the general trends within the distribution of the two variables under study (Indian blood level and education of Creek mothers and fathers). Thus, the use of the contour map inasmuch as it seems to visually portray continuous data more effectively by connecting all data points pertaining to Creek mothers and fathers (blood and educational levels) having the same numeric value.

Tribal decision makers also opted for contour maps because of (in their opinion) ease of interpretation due to map simplicity. For generating the various contour maps used in this study, the A-Outline, B-Data Points, E-Values, and F-Map data packages were used.[17]

In past years, Creek planners have used tabular data and a dot map to visually display where tribal members lived who may be eligible for participation in Creek sponsored educational programs. Since Creek parents with varying degrees of Indian ancestry (e.g., blood level) and education are widely distributed over several thousand square miles of

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[17] Interview with James King, Director, Creek Nation Department of Human Resources.

the Creek Nation, the first requirement of TEPIS was to produce accurate visual displays of the tribal service area depicting parent blood levels and education.

To meet visual information needs--identifying potential client concentrations, by Indian ancestry and education--called for the development of eight SYMAPs of Creek parental education and Indian blood levels for both the northern and southern regions of the Creek Nation. The study area was divided into two regions because of program limitations to 1,000 data points. The northern area contains 822 data points with the southern area containing over 400; thus, necessitating the division into two regions. The following steps reflect necessary procedures in establishing complete card decks preparatory to producing computer maps of the two regions.

Step 1. The A-Outline package of SYMAP calls for the definition of the study area or map area in which data values will be displayed and interpolation takes place. In this study, the author obtained a large topographical map of the tribal area (Figure 1). Using a grid reference sheet, a list of verticles--X and Y coordinates--were identified in a clock-wise direction for the outline of the tribal area noting where the outline changed directions.[18]

Step 2. B-Data points are required for contour maps to specify the locations with data values. For this study, it was decided that interview location rather than street addresses or counties would serve as appropriate geographical identifiers inasmuch as they more precisely

[18]Dougenik and Sheehan, Part II, pp. 26-56.

defined sample location. Furthermore, the actual interview site was easy to obtain without extensive recording required by other geographical units. Next, the approximate center for each interview was determined and the X and Y coordinates plotted using the grid reference sheet.

Step 3. The E-Value package of SYMAP associates data values with each data point. Data relating to Creek mother and father Indian blood level and education was taken from each questionnaire and transferred by computer to IBM 80 X 80 cards. Furthermore, these computer cards were divided into eight decks:

Deck One----Creek Mother Education, Northern Region

Deck Two----Creek Mother Education, Southern Region

Deck Three--Creek Mother Blood Level, Northern Region

Deck Four---Creek Mother Blood Level, Southern Region

Deck Five---Creek Father Education, Northern Region

Deck Six----Creek Father Education, Southern Region

Deck Seven--Creek Father Blood Level, Northern Region

Deck Eight--Creek Father Blood Level, Southern Region

Step 4. In the SYMAP program, 38 F-Map electives are available for use depending on the map output desired. The F-Map package enables a user to specify the precise form of the printed output. The most important specifications include the size of the map, the number of value class intervals, the range of values and a general labeling of each map. In this study output contour maps were 20 by 30 inches and then reduced to page size. Various levels of density were specified for each map. These levels and the range of each level appear in the legend accompanying each map.

Statistical Methodology: Application of the SPSS Program

SPSS, like SYMAP, is accessible to a wide audience (including Creek tribal educational planners, through Oklahoma State University Extension Service) in post-secondary education by extensive documentation now available from the SPSS Corporation.[19] The SPSS program was a logical choice for inclusion in TEPIS methodology due to its integrated system of computer programs designed for the analysis of social science data such as collected in the 1975 tribal survey (Appendix A).

The intent of TEPIS is to statistically and cartographically describe social reality rather than construct broad gauge or middle-range social theory. The statistical component of TEPIS, like the cartographical component, begins with the conceptualized notion that a relationship between Indian blood level or ancestry and education of Creek parents may exist; and that this interrelationship may have a degree of causal effect one upon the other.

To this end, an empirical data base of 1,956 parental respondents was drawn from a sampling of 1,225 Creek Indian households. Again, the selection of these two variables was based on the importance of education to Creek Nation development programs and the requirement, by tribal policy, that a person need be at least one-eighth to one-fourth Indian ancestry in order to participate in tribally financed educational programs.[20]

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[19] Norman H. Nie et al., Statistical Package for the Social Sciences (New York, 1975).

[20] Personal interview with James King.

The author then formulated a null hypothesis regarding what pattern of interrelationships should be found in the empirical indicators if the original idea about the operation of Indian blood level and education of Creek parents was correct. This hypothesis reflects not only a test structure of the spatial aspects of these interrelationships (SYMAP) but a statistical treatment as well (SPSS). The principal reason for using statistical techniques (SPSS) in TEPIS, in conjunction with SYMAP, is the reinforcing of the visual display through quantitative analysis.

The data were then analyzed using crosstabulation and Chi-square as statistical methods, in order to determine whether an expected pattern of relationship (ancestry and education) can actually be discerned from the data. Sample population ancestry (Indian blood level) and education are also depicted by use of histograms describing and comparing education by blood level for each parent category (mother and father) in addition to summary data combined in both categories. As such, both a quantitative and qualitative (graphical) approach are used to convey results of variable crosstabulation and possible interrelationship.

Measure of data pertaining to parental Indian ancestry and education is on an interval scale. Parental education and blood level are expressed in school years completed and blood level in fractions. Thus, data will show exactly how much education the respondent has achieved and what degree of Indian ancestry expressed by blood level.[21]

Because data used in TEPIS may not be normally distributed (total tribal population was not interviewed), a non-parametric statistic,

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[21] Patrick McCullogh, <u>Data Use and Interpretation</u> (London, 1974), pp. 1-23.

Chi-square was used. Chi-square was selected in order to determine the statistical difference (or lack of) between sample parents' Indian blood and educational level.[22]

Comparison of ancestry (Indian blood level) and education of Creek parents required a display using Chi-square analysis. The data were then analyzed for significance of relationship using the Chi-square statistic and the SPSS crosstabulation option. However, because certain conditions must be present in order for the Chi-square statistic to be valid, it was necessary to collapse Tables I and IV go those matrixes depicted in Tables II, V and VII. This procedure was necessary because:

(1) Data used in Chi-square must be of the counted variety. That is to say it must be in the form of frequencies. For example, the number of any particular variables such as education or Indian blood level counted in a particular area may legitimately be used as an observed frequency, but a percentage number, or number of Indian families per square kilometer, may not.[23]

(2) Total observed frequencies must equal at least 20.

(3) Generally the expected frequency calculated for any fraction (in any cell) should not be less than five, although it is permissible for 20 percent of fractions involved in a calculation to have an expected frequency of less than five, provided it is not less than one.

Summary

The methodological process in developing TEPIS involved designing

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[22]Ibid.

[23]Ibid.

a survey instrument which was composed of fixed alternative type questions in order to facilitate data processing using two computer based software programs: SPSS and SYMAP. Questions were designed by both the author, Oklahoma State University staff and tribal planners to reflect immediate and long-term organizational data needs. This organizational data need was in part satisfied by formulating questions designed to elicit information from respondents regarding social well-being, patterns of tribal care or services being received, educational characteristics and degree of Indian ancestry.

The sampling process used was both systematic and random. Each township (a geographical unit containing 36 square miles of land) was surveyed. Each household surveyed was randomly selected by using a table of random numbers. Section numbers within each township were used as a randomly generated sampling point. Each sampling point for each household surveyed was identified by range, township and section numbers for use in the SYMAP program, for purposes of cartographical analysis.

The study area was then divided into two regions. The northern region (containing the Tulsa Standard Metropolitan Statistical Area) contains 822 data points with the southern region containing 400. This was done in order to meet SYMAP program limitations of 1,000 data points.

Using a grid reference sheet, a list of vertices--X and Y coordinates--were identified for the study area. This procedure produced a definition of the study area map in which parental education and Indian blood levels were displayed. A similar procedure (identification of each respondent household location by X-Y coordinates) was then accomplished for mothers and fathers, for both the northern and southern regions of the Creek Nation. Eight IBM 80 x 80 card decks were then prepared containing data pertaining to parental education and Indian blood level. Contour maps were then produced for each variable by parental category for each region and then reduced to page size.

In addition to cartographical methodologies, statistical methods available in SPSS were employed. Data were analyzed using variable crosstabulation and the Chi-square statistical test as methods to determine whether an expected pattern of relationship could actually be discerned from collected data. Output from SPSS was also used in developing and comparing education by Indian blood level for each parental category (mother and father). In this way both a quantitative and graphical approach would be used to convey results of variable crosstabulation. This approach would also enhance the reinforcing of the visual display of data from SYMAP.

CHAPTER IV

ANALYSIS

Introduction

Chapter IV comprises both statistical and visual analysis of the feasibility in joint application of SPSS and SYMAP in developing tribal educational planning and information systems. The functional utility of TEPIS is demonstrated by using, as a basis for analysis, Indian blood level or ancestry, and education of Creek parents. The reliability of TEPIS is documented by statistical and visual output and demonstrates the rigor exercised at each step in analyzing data used in system formulation. Although the TEPIS structure explained may not be the only one now available to the Creek Nation, it is the only model to date, tested and proved workable in experience.

TEPIS is comprised of three major components: a data base pertaining to Creek parents from which data are extracted for input to SPSS and SYMAP; a statistical component (SPSS) and a cartographical component (SYMAP). As indicated in Chapter III, the computer programs are very flexible, user oriented, and adhere to uniform high quality standards. The data base comprising TEPIS is composed of information collected via a random sample of 1,225 Creek families, reflecting an effective total of 1,956 parents, in 1975. The flexibility of TEPIS would allow any survey instrument, from which data could be coded in a form compatible to SPSS or SYMAP, to be used. It is not, however, the purpose of this investigation to provide an analytical view of the mechanical procedures involved in programming SPSS and SYMAP, but considerations and recommendations in applying the two computer software programs in a tribal educational planning situation.

Tables, bar histographs, and computer produced contour maps are utilized to describe various aspects pertaining to parental education and Indian ancestry or blood level of the sample population. Tables are utilized primarily to portray a quantitative summary of collected data pertaining to both Creek mothers and fathers. Bar histographs are used to graphically depict additional comparisons not always present in tables. Computer maps visually display geographical distribution patterns of characteristics pertaining to parental education and Indian blood level for each of the two regions under study.

Statistical Analysis: Creek Mother Education and Indian Blood Level

The null hypothesis is: There is no significant difference between Creek mothers' education by Indian ancestry or blood level.

Table I describes by variable crosstabulation a descriptive and statistical relationship between education of all Creek mothers surveyed by Indian ancestry or blood level. Education and blood level intervals used are those initially requested by tribal staff. However, in order to validate and simplify the use of Chi-square, this table, along with Table IV (Creek fathers), was collapsed to value intervals indicated in Tables II and III, V and VI, and VII and VIII.

Table I indicates a general pattern of difference between Indian ancestry of mother and education. Also, there appears to be a

TABLE I

SPSS SAMPLE OUTPUT--EDUCATIONAL LEVEL OF MOTHER BY
INDIAN ANCESTRY OR BLOOD LEVEL

(1) COUNT (2) ROW PCT (3) COL PCT (4) TOT PCT Education		Indian Blood Level									
		9	1/8	2/8 or 1/4	3/8	4/8 or 1/2	5/8	6/8 or 3/4	7/8	8/8 or 4/4	Row Total
K-6 years	(1)	9	5	4	2	6	1	5	3	83	118
	(2)	7.6%	4.2%	3.4%	1.7%	5.1%	0.8%	4.2%	2.5%	70.3%	10.8%
	(3)	5.6%	13.2%	7.3%	16.7%	5.9%	5.0%	8.8%	11.5%	13.3%	
	(4)	0.8%	0.5%	0.4%	0.2%	0.5%	0.1%	0.5%	0.3%	7.6%	
7-9 years	(1)	21	4	15	1	17	3	5	1	146	213
	(2)	9.9%	1.9%	7.0%	0.5%	0.8%	1.4%	2.3%	0.5%	68.5%	19.5%
	(3)	13.0%	10.5%	27.3%	8.3%	16.8%	15.0%	8.8%	3.8%	23.5%	
	(4)	1.9%	0.4%	1.4%	0.1%	1.6%	0.3%	0.5%	0.1%	13.4%	
10 years	(1)	17	3	5	0	10	2	5	1	51	94
	(2)	18.1%	3.2%	5.3%	0.0%	10.6%	2.1%	5.3%	1.1%	54.3%	8.6%
	(3)	10.6%	7.9%	9.1%	0.0%	9.9%	10.0%	8.8%	3.8%	8.2%	
	(4)	1.6%	0.3%	0.5%	0.0%	0.9%	0.2%	0.5%	0.1%	4.7	
11 years	(1)	17	6	5	2	9	3	3	3	73	121
	(2)	14.0%	5.0%	4.1%	1.7%	7.4%	2.5%	2.5%	2.5%	60.3%	11.1%
	(3)	10.6%	15.8%	9.1%	16.7%	8.9%	15.0%	5.3%	11.5%	11.7%	
	(4)	1.6%	0.5%	0.5%	0.2%	0.8%	0.3%	0.3%	0.3%	6.7%	

TABLE I (Continued)

(1) COUNT (2) ROW PCT (3) COL PCT (4) TOT PCT Education		Indian Blood Level 0	1/8	2/8 or 1/4	3/8	4/8 or 1/2	5/8	6/8 or 3/4	7/8	8/8 or 4/4	Row Total
12 years	(1)	76	15	13	4	33	9	22	9	181	362
	(2)	21.0%	4.1%	3.6%	1.1%	9.1%	2.5%	6.1%	2.5%	50.0%	33.2%
	(3)	47.2%	39.5%	23.6%	33.3%	32.7%	45.0%	38.6%	34.6%	29.1%	
	(4)	7.0%	1.4%	1.2%	0.4%	3.0%	0.8%	2.0%	0.8%	19.6%	
Post H.S. 1 year	(1)	5	2	6	0	8	0	6	1	30	58
	(2)	8.6%	3.4%	10.3%	0.0%	13.8%	0.0%	10.3%	1.7%	51.7%	5.3%
	(3)	3.1%	5.3%	10.9%	0.0%	7.9%	0.0%	10.5%	3.8%	4.8%	
	(4)	0.5%	0.2%	0.5%	0.0%	0.7%	0.0%	0.5%	0.1%	2.7%	
14 years	(1)	8	0	2	2	12	0	8	4	35	71
	(2)	11.3%	0.0%	2.8%	2.8%	16.9%	0.0%	11.3%	5.6%	49.3%	6.5%
	(3)	5.0%	0.0%	3.6%	16.7%	11.9%	0.0%	14.0%	15.4%	5.6%	
	(4)	0.7%	0.0%	0.2%	0.2%	1.1%	0.0%	0.7%	0.4%	3.2%	
15 years	(1)	0	0	0	1	1	0	1	1	7	11
	(2)	0.0%	0.0%	0.0%	9.1%	9.1%	0.0%	9.1%	9.1%	63.6%	1.0%
	(3)	0.0%	0.0%	0.0%	8.3%	1.0%	0.0%	1.8%	3.8%	1.1%	
	(4)	0.0%	0.0%	0.0%	0.1%	0.1%	0.0%	0.1%	0.1%	0.6%	
16 years	(1)	5	2	4	0	2	2	0	2	3	20
	(2)	25.0%	10.0%	20.0%	0.0%	10.0%	10.0%	0.0%	10.0%	15.0%	1.8%
	(3)	3.1%	5.3%	7.3%	0.0%	2.0%	10.0%	0.0%	7.7%	0.5%	
	(4)	0.5%	0.2%	0.4%	0.0%	0.2%	0.2%	0.0%	0.2%	0.3%	

TABLE I (Continued)

(1) COUNT (2) ROW PCT (3) COL PCT (4) TOT PCT Education		Indian Blood Level									Row Total
		0	1/8	2/8 or 1/4	3/8	4/8 or 1/2	5/8	6/8 or 3/4	7/8	8/8 or 4/4	
17-18 years	(1)	1	1	0	0	0	0	0	1	1	4
	(2)	25.0%	25.0%	0.0%	0.0%	0.0%	0.0%	0.0%	25.0%	25.0%	0.4%
	(3)	0.6%	2.6%	0.0%	0.0%	0.0%	0.0%	0.0%	3.8%	0.2%	
	(4)	0.1%	0.1%	0.0%	0.0%	0.0%	0.0%	0.0%	0.1%	0.1%	
Over 18 years	(1)	0	0	0	0	1	0	2	0	1	4
	(2)	0.0%	0.0%	0.0%	0.0%	25.0%	0.0%	50.0%	0.0%	25.0%	0.4%
	(3)	0.0%	0.0%	0.0%	0.0%	1.0%	0.0%	3.5%	0.0%	0.2%	
	(4)	0.0%	0.0%	0.0%	0.0%	0.1%	0.0%	0.2%	0.0%	0.1%	
No response	(1)	2	0	1	0	2	0	0	0	11	16
	(2)	12.5%	0.0%	6.3%	0.0%	12.5%	0.0%	0.0%	0.0%	68.8%	1.5%
	(3)	1.2%	0.0%	1.8%	0.0%	2.0%	0.0%	0.0%	0.0%	1.8%	
	(4)	0.2%	0.0%	0.1%	0.0%	0.2%	0.0%	0.0%	0.0%	1.0%	
Column Total		161 14.7%	38 3.5%	55 5.0%	12 1.1%	101 9.2%	20 1.8%	57 5.2%	26 2.4%	622 57.0%	1092 100.0%

Number of missing observations = 0

Source: Field Survey, Creek Nation, March-August, 1975.

significant drop in the number of school years beyond high school completed by Creek mothers. Of the 1,092 mothers responding, 10.8 percent (118) had not completed more than six years with 19.5 percent (213) completing at least nine years of school. Fully 19.7 percent (215) of the respondents completed at least one year of high school with 33.2 percent (362) of the sample indicating that they had successfully completed high school.

Only 15.4 percent (168) of the Creek mothers surveyed indicated education beyond high school. Of this number, 5.3 percent (58) indicated completing one year beyond high school with 6.5 percent (71) completing at least two years. A very small proportion, 1.8 percent (20), indicated they had completed four years of college and an even smaller proportion, 0.8 percent (8), indicated professional level education (i.e., 17 years or more).

Table II depicts the observed frequencies of a collapsed Table I. Table II shows that almost as many individuals (118) completed only six years of education as did post secondary (168).

Table II also shows that for the most frequently mentioned educational level of 12 years, the majority of respondents have a high blood quantum (5/8 to 8/8). Further, more respondents had achieved less than 12 years of school (546) than those who did (530).

The relationship may be due to tribal priorities regarding participation in educational programs. Those individuals having a high degree of Indian ancestry (1/4 or more) are encouraged to take advantage of Federally financed educational programs; this encouragement may stem in part from a greater desire to help those individuals closer to tribal

TABLE II

OBSERVED FREQUENCIES: CREEK MOTHER EDUCATION BY INDIAN ANCESTRY OR BLOOD LEVEL

Education	0			1/8 to 1/4			3/8 to 1/2			5/8 to 8/8			Total Pct.	Row Totals	
K-6 years	a)	(9)	7.6%	b)	(9)	7.6%	c)	(8)	6.7%	d)	(92)	77.9%	100%	(118)	10.9%
7-9 years	e)	(21)	9.8%	f)	(19)	8.9%	g)	(18)	8.4%	h)	(155)	72.7%	100%	(213)	19.7%
10-11 years	i)	(34)	15.8%	j)	(19)	8.8%	k)	(21)	9.7%	l)	(141)	65.5%	100%	(215)	20.0%
12 years	m)	(76)	20.9%	n)	(28)	7.7%	o)	(37)	10.2%	p)	(221)	61.0%	100%	(362)	34.0%
Post HS+	q)	(19)	11.3%	r)	(17)	10.1%	s)	(27)	16.0%	t)	(105)	62.5%	100%	(168)	15.6%
Column Totals		(159)	15.0%		(92)	8.5%		(111)	10.3%		(714)	66.3%		1076*	100%

May not total 100% due to rounding.

*Excludes no response category.

Source: Table I.

culture than those further removed from the tribal culture.[1]

Table II shows Creek mothers' Indian ancestry (or blood level) and education are related. This relationship suggests that the statistical and geographical delineation of Creek parents may indeed be important in identifying tribal problems. Thus, a system whereby tribal members' Indian ancestry, educational level, and location characteristics can be identified could be a valuable tool in locating and allocating tribal resources in combating educational disparities by identifying these disparities among Creek parents.

This observed relationship also underscores the ability of tribal planners using this methodology in developing a planning process by which they can identify the educational needs of those in their tribal communities and plan programs to meet those needs. This would also allow tribal planners to make explicit the expectation that tribal human service organizations can document program requirements according to needs of their client population.[2]

Table III depicts observed, expected and Chi-square values for each blood and educational level found in Table II. The cell by cell depiction of frequencies and values in Table III suggests significant differences between mother's blood and educational level. Creek mothers from 5/8 to 8/8 blood level are less educated than one would theoretically expect at 10 to 11 years of education, 12 years of education and

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[1]Personal interview with James King (Okmulgee, February 10, 1975).

[2]George J. Warheit, Roger A. Bell, and John J. Schwamk, Planning for Change: Needs Assessment Approaches, NIH-MH-Grant-15900-05, Series 1, pp. 62-70.

TABLE III

CELL DESCRIPTION IN CHI-SQUARE ANALYSIS OF EDUCATIONAL AND INDIAN ANCESTRY OR BLOOD LEVEL OF MOTHER

Education	Cell (Table II)	Blood Level	Observed Value	Expected Value	Observed-Expected	O-E^2	Chi-Square Value
K-6 years	a	0	9	17.44	-8.44	71.23	4.08
	b	1/8-1/4	9	10.09	-1.09	1.19	.12
	c	3/8-1/2	8	12.17	-4.17	17.39	1.43
	d	5/8-8/8	92	78.30	13.70	187.69	2.40
7-9 years	e	0	21	31.47	-10.47	109.62	3.48
	f	1/8-1/4	19	18.21	0.79	.62	.03
	g	3/8-1/2	18	21.97	-3.97	15.76	.72
	h	5/8-8/8	155	141.34	13.66	186.60	1.32
10-11 years	i	0	34	31.77	2.23	4.97	.16
	j	1/8-1/4	19	18.38	.62	.38	.02
	k	3/8-1/2	21	22.18	-1.18	1.39	.06
	l	5/8-8/8	141	142.67	-1.67	2.79	.02

TABLE III (Continued)

Education	Cell (Table II)	Blood Level	Observed Value	Expected Value	Observed-Expected	$O-E^2$	Chi-Square Value
12 years	m	0	76	53.49	22.51	506.70	9.47
	n	1/8-1/4	28	30.95	-2.95	8.70	.28
	o	3/8-1/2	37	37.34	-.34	.12	.00
	p	5/8-8/8	221	240.21	-19.21	369.02	1.54
Post secondary	q	0	19	24.83	-5.83	33.99	1.37
	r	1/8-1/4	17	14.36	2.64	6.97	.49
	s	3/8-1/2	27	17.33	9.67	93.51	4.84
	t	5/8-8/8	105	111.48	-6.48	41.99	.38

Note: $X^2 = 32.21$; df = 12; p = < .005.

Source: Table II

post-secondary education. The most pronounced differences for full blood Creek mothers were at the 12 years education level where fewer mothers were found with a high school education than what should be expected.

The significant difference between mother's education and blood level is especially evident for those respondents completing 12 years of school and indicating no Indian ancestry. Here there is noted a significant difference between what one would expect (53.49) as opposed to the frequency actually observed (76). The Chi-square for these particular values accounts for 29 percent of the total Chi-square value for Indian blood quantum of mother and education.

Second in significance between observed and expected value after an educational level of 12 years is K to 6 years. Here the total Chi-square value is 8.03. The highest value for this level is again those Creek mothers indicating no Indian ancestry. Third in significance relative to total Chi-square value is all levels of post-secondary, followed by 7 to 9 years and last 10 to 11 years. Thus, it appears that the two extremes of either no Indian ancestry or practically full blood (e.g., 5/8 to 8/8) show the greatest range of difference.

Entering a Chi-square table with 12 degrees of freedom the result, 32.21, is significant at the .005 level. This indicates that there is less than five chances in a thousand that the hypothesis would be rejected when it should have been accepted. This high significance level also indicates that there are in fact significant differences between Indian ancestry and education. Therefore, the null hypothesis, that there is no significant difference between mother's education by Indian ancestry or blood level, is rejected.

Statistical Analysis: Creek Father Education and Indian Blood Level

Null hypothesis: There is no significant difference between Creek father's education by Indian ancestry or blood level.

Table IV depicts the results of variable crosstabulation of Indian ancestry (blood level) and education. As evidenced among Creek mothers, there appears to be significant differences between ancestry and education, especially for those Creek fathers completing 12 years. Of all Creek fathers, 49.1 percent had not completed 12 years of school compared to 50.9 percent who did.

For Creek fathers whose Indian blood quantum is 8/8 (or full blood), the majority (55.1 percent) have less than 12 years of school (Table IV). Only 26.3 percent completed high school, while 16.6 percent had completed from one to four years of post-secondary education (primarily college).

For Creek fathers with no Indian blood, the educational achievement level was found to be somewhat higher. Only 43.6 percent of those individuals had not completed at least 12 years of school, compared to 55.8 percent who did.

Of the total sample population, relative to Creek fathers, 28.9 percent had completed 12 years of school. Using row distributions in Table IV (refer to number (2) in column one), 37.5 percent of these individuals exhibited an Indian blood level of 1/2 or less, with the remaining 62.5 percent having a blood quantum of greater than 1/2. Conversely, those individual fathers achieving less than 12 years of school exhibited high blood quantum (4/8 to 8/8).

TABLE IV

SPSS SAMPLE OUTPUT--EDUCATIONAL LEVEL OF FATHER BY INDIAN ANCESTRY OR BLOOD LEVEL

(1) COUNT (2) ROW PCT (3) COL PCT (4) TOT PCT Education		Indian Blood Level									
		0	1/8	2/8 or 1/4	3/8	4/8 or 1/2	5/8	6/8 or 3/4	7/8	8/8 or 4/4	Row Total
K-66years	(1)	17	2	5	1	6	3	4	5	101	144
	(2)	11.8%	1.4%	3.5%	0.7%	4.2%	2.1%	2.8%	3.5%	70.1%	16.1%
	(3)	13.0%	6.1%	12.2%	9.1%	8.8%	21.4%	9.5%	22.7%	19.0%	
	(4)	1.9%	0.2%	0.6%	0.1%	0.7%	0.3%	0.4%	0.6%	11.3%	
7-9 years	(1)	23	7	12	1	9	1	4	1	107	165
	(2)	13.9%	4.2%	7.3%	0.6%	5.5%	0.6%	2.4%	0.6%	64.8%	18.5%
	(3)	17.6%	21.2%	29.3%	9.1%	13.2%	7.1%	9.5%	4.5%	20.1%	
	(4)	2.6%	0.8%	1.3%	0.1%	1.0%	0.1%	0.4%	0.1%	12.0%	
10 years	(1)	9	1	3	0	4	2	1	0	43	63
	(2)	14.3%	1.6%	4.8%	0.0%	6.3%	3.2%	1.6%	0.0%	68.3%	7.0%
	(3)	6.9%	3.0%	7.3%	0.0%	5.9%	14.3%	2.4%	0.0%	8.1%	
	(4)	1.0%	0.1%	0.3%	0.0%	0.4%	0.2%	0.1%	0.0%	4.8%	
11 years	(1)	8	4	6	1	4	0	2	0	42	67
	(2)	11.9%	6.0%	9.0%	1.5%	6.0%	0.0%	3.0%	0.0%	62.7%	7.5%
	(3)	6.1%	12.1%	14.6%	9.1%	5.9%	0.0%	4.8%	0.0%	7.9%	
	(4)	0.9%	0.4%	0.7%	0.1%	0.4%	0.0%	0.2%	0.0%	4.7%	

TABLE IV (Continued)

(1) COUNT (2) ROW PCT (3) COL PCT (4) TOT PCT Education		Indian Blood Level 0	1/8	2/8 or 1/4	3/8	4/8 or 1/2	5/8	6/8 or 3/4	7/8	8/8 or 4/4	Row Total
12 years	(1)	47	14	6	6	24	2	12	7	140	258
	(2)	18.2%	5.4%	2.3%	2.3%	9.3%	0.8%	4.7%	2.7%	54.3%	28.9%
	(3)	35.9%	42.4%	14.6%	54.5%	35.3%	14.3%	28.6%	31.8%	26.3%	
	(4)	5.3%	1.6%	0.7%	0.7%	2.7%	0.2%	1.3%	0.8%	15.7%	
post H.S. 1 year	(1)	8	2	4	0	4	0	0	0	22	40
	(2)	20.0%	5.0%	10.0%	0.0%	10.0%	0.0%	0.0%	0.0%	55.0%	4.5%
	(3)	6.1%	6.1%	9.8%	0.0%	5.9%	0.0%	0.0%	0.0%	4.1%	
	(4)	0.9%	0.2%	0.4%	0.0%	0.4%	0.0%	0.0%	0.0%	2.5%	
14 years	(1)	11	0	2	0	7	2	14	4	34	74
	(2)	14.9%	0.0%	2.7%	0.0%	9.5%	2.7%	18.9%	5.4%	45.9%	8.3%
	(3)	8.4%	0.0%	4.9%	0.0%	10.3%	14.3%	13.3%	18.2%	6.4%	
	(4)	1.2%	0.0%	0.2%	0.0%	0.8%	0.2%	1.6%	0.4%	3.8%	
15 years	(1)	1	0	1	0	3	1	2	1		27
	(2)	3.7%	0.0%	3.7%	0.0%	11.1%	3.7%	7.4%	3.7%	66.7%	3.0%
	(3)	0.8%	0.0%	2.4%	0.0%	4.4%	7.1%	4.8%	4.5%	3.4%	
	(4)	0.1%	0.0%	0.1%	0.0%	0.3%	0.1%	0.2%	0.1%	2.0%	
16 years	(1)	5	2	1	0	4	1	4	3	11	27
	(2)	18.5%	7.4%	3.7%	0.0%	14.8%	3.7%	0.0%	11.1%	40.7%	3.0%
	(3)	3.8%	6.1%	2.4%	0.0%	5.9%	7.1%	0.0%	13.6%	2.1%	
	(4)	0.6%	0.2%	0.1%	0.0%	0.4%	0.1%	0.0%	0.3%	1.2%	

TABLE IV (Continued)

(1) COUNT (2) ROW PCT (3) COL PCT (4) TOT PCT Education		Indian Blood Level									
		0	1/8	2/8 or 1/4	3/8	4/8 or 1/2	5/8	6/8 or 3/4	7/8	8/8 or 4/4	Row Total
17-18 years	(1)	0	0	0	1	3	2	1	1	1	9
	(2)	0.0%	0.0%	0.0%	11.1%	33.3%	22.2%	11.1%	11.1%	11.1%	1.0%
	(3)	0.0%	0.0%	0.0%	9.1%	4.4%	14.3%	2.4%	4.5%	0.2%	
	(4)	0.0%	0.0%	0.0%	0.1%	0.3%	0.2%	0.1%	0.1%	0.1%	
Over 18 years	(1)	1	1	1	0	0	0	1	0	2	6
	(2)	16.7%	16.7%	16.7%	0.0%	0.0%	0.0%	16.7%	0.0%	33.3%	0.7%
	(3)	0.8%	3.0%	2.4%	0.0%	0.0%	0.0%	2.4%	0.0%	0.4%	
	(4)	0.1%	0.1%	0.1%	0.0%	0.0%	0.0%	0.1%	0.0%	0.2%	
No response	(1)	1	0	0	1	0	0	1	0	11	14
	(2)	7.1%	0.0%	0.0%	7.1%	0.0%	0.0%	7.1%	0.0%	78.6%	1.6%
	(3)	0.8%	0.0%	0.0%	9.1%	0.0%	0.0%	2.4%	0.0%	2.1%	
	(4)	0.1%	0.0%	0.0%	0.1%	0.0%	0.0%	0.1%	0.0%	1.2%	
Column Total		131 14.7%	33 3.7%	41 4.6%	11 1.2%	68 7.6%	14 1.6%	42 4.7%	22 2.5%	532 59.5%	894 100.0%

Number of missing observations = 0

Source: Field Survey, Creek Nation, March-August, 1975.

Table V illustrates observed frequencies regarding the Creek Indian father's education by Indian blood level. The largest number of Creek fathers attaining 12 years or more of education had an Indian blood level of 5/8 to 8/8. This group also has the highest number of individuals completing less than nine years of school.

As is true of Creek Indian mothers, there are significant differences between Creek fathers' Indian ancestry and education. This suggests that the statistical and geographical delineation of Creek parents may be important in identifying tribal educational problems. TEPIS would allow for the quantitative identification of educational characteristics among Creek people, with the resulting refinement of education program proposals to garner resources to rectify such problems.

As inferred in Tables IV and V, Table VI displays significant difference between Indian blood and educational level of Creek fathers. This relationship is especially evident when comparing the variance of observed and expected values in Table VI. The two most significant values appear to be those relating K to 6 and 12 years of education with full-bloods (8/8). Table VI statistically shows for Creek fathers with a post secondary education the variance between expected and observed values increases as blood level increases up to one-half blood level. This condition is not as evident for persons completing less than 12 years of school. Full blood Creek fathers, like full blood Creek mothers, tend to be less educated at the high school and post secondary levels, but the discrepancy between observed and expected values was not as large in the case of Creek mothers.

Table VI represents a sample of 880 Creek fathers relative to their educational level (expressed as number of school years completed) and

TABLE V

OBSERVED FREQUENCIES: FATHER EDUCATION
BY INDIAN ANCESTRY OR BLOOD LEVEL

Education	Indian Blood Level												Total	Row Totals	
	0			1/8-1/4			3/8-1/2			5/8-8/8			Pct.		
K-6 years	a)	(17)	11.8%	b)	(7)	5.0%	c)	(7)	5.0%	d)	(113)	78.4%	100%	(144)	16.3%
7-9 years	e)	(23)	14.0%	f)	(19)	11.5%	g)	(10)	6.0%	h)	(113)	68.5%	100%	(165)	18.7%
10-11 years	i)	(17)	13.1%	j)	(14)	10.7%	k)	(19)	14.6%	l)	(90)	69.2%	100%	(130)	14.7%
12 years	m)	(47)	18.2%	n)	(20)	7.8%	o)	(30)	11.6%	p)	(161)	62.4%	100%	(258)	29.3%
Post HS+	q)	(26)	14.2%	r)	(14)	7.6%	s)	(22)	12.0%	t)	(122)	66.6%	100%	(183)	20.7%
Column Totals		(130)	14.7%		(74)	8.4%		(78)	8.9%		(598)	67.9%		880*	100%

May not total 100% due to rounding.

*Excludes no response category.

Source: Table IV.

TABLE VI

CELL DESCRIPTION OF CHI-SQUARE ANALYSIS OF
EDUCATIONAL AND INDIAN ANCESTRY OR
BLOOD LEVEL OF FATHER

Education	Cell (Table V)	Blood Level	Observed Value	Expected Value	Observed-Expected	$O-E^2$	Chi-Square Value
K-6 years	a	0	17	21.27	-4.27	18.23	.86
	b	1/8-1/4	7	12.11	-5.11	26.11	2.16
	c	3/8-1/2	7	12.76	-5.76	33.12	2.60
	d	5/8-8/8	113	97.85	15.15	229.52	2.34
7-9 years	e	0	23	24.38	-1.38	1.90	.08
	f	1/8-1/4	19	13.88	5.12	26.21	1.89
	g	3/8-1/2	10	14.63	-4.63	21.44	1.47
	h	5/8-8/8	113	112.13	.87	.76	.01
10-11 years	i	0	17	19.20	-2.20	4.84	.25
	j	1/8-1/4	14	10.93	3.07	9.42	.86
	k	3/8-1/2	9	11.52	-2.52	6.35	.55
	1	5/8-8/8	90	88.34	1.66	2.76	.03

TABLE VI (Continued)

Education	Cell (Table V)	Blood Level	Observed Value	Expected Value	Observed-Expected	$O-E^2$	Chi-Square Value
12 years	m	0	47	38.11	8.89	79.03	2.07
	n	1/8-1/4	20	21.70	-1.70	2.89	.13
	o	3/8-1/2	30	22.87	7.13	50.84	2.22
	p	5/8-8/8	161	175.32	-14.32	205.06	1.17
Post secondary	q	0	26	27.03	-1.03	1.06	.04
	r	1/8-1/4	14	15.39	-1.39	1.93	.13
	s	3/8-1/2	22	16.22	5.78	33.41	2.06
	t	5/8-8/8	121	124.36	-3.36	11.29	.09

$X^2 = 21.02$; df = 12; p = .050.

Source: Table V.

Indian ancestry or blood level. The basic purpose of Tables V and VI, as in Tables II and III, is to explain and test the sample's conformity to the total Creek father population and to determine the strength of relationship between parent educational level and Indian ancestry expressed by blood quantum.

Table VI reflects a Chi-square analysis of Creek father Indian ancestry and educational level. Table VI also reflects significant differences between blood level and education of Creek fathers. This difference is especially evident when comparing those fathers indicating no Indian ancestry with those with high Indian blood levels.

The highest Chi-square value (7.97) is found at a somewhat low educational level, K to 6 years. This value accounts for 37.9 percent of the total Chi-square for Table VI. The higher blood quantums found at this particular educational level (K to 6 years) appear to account for the majority of the difference.

The second highest Chi-square (5.59) is found at the 12 year educational level. Individual Creek fathers with no Indian ancestry is high, but the majority of this value (3.39) is found at a blood quantum of 3/8 to 8/8. However, even when combining the Chi-square values of those completing 12 years of school and those completing at least some post-secondary education, they do not equal that value expressed for Creek fathers achieving only an elementary education (K to 6 years). Thus, the significant differences noted between blood quantum and education among Creek fathers is found (relatively speaking) among the very low and high educational levels.

The observed value column in Table VI lists (as in Table III) the sample distribution regarding education and Indian blood level. The expected value column lists the frequency distribution which would theoretically result if the null hypothesis were true. The difference (observed minus expected value) depicts the absolute difference between the observed minus expected values. The Chi-square for this particular variable comparison is 21.02. Entering the Chi-square table with 12 degrees of freedom (df), the result, 21.02, is significant at the .05 level. This indicates that there is less than five chances in 100 that the hypothesis would be rejected when it should have been accepted. This high significance level also indicates that there are in fact significant differences between Creek fathers' Indian ancestry and education. Therefore, the null hypothesis, that there is no significant difference between fathers' education and Indian ancestry or blood level, is rejected.

The Chi-square analysis showed a marked discrepancy for both full blood Creek mothers and fathers in their educational attainment at the high school and college level. This is despite the fact that the histogram, notably Figure 6, showed a relatively high percentage of mothers and fathers with at least a high school education. In closer inspection of the low educational attainment of full blood Creek parents, through computer mapping, one can isolate those geographic regions wherein the full bloods with low educational attainment reside. The geographic origin of these individuals appears to be rural areas of the southern region. The implications of combining SPSS and SYMAP results in creating a methodology whereby tribal planners can pinpoint, quantitatively and geographically, areas of greatest educational need.

Statistical Analysis: Total Sample Population

Null hypothesis: There is no significant difference between the total Creek Indian parent population by education and Indian ancestry or blood level.

Tables VII and VIII summarize the statistical differences and frequency distribution evident between Creek mothers and fathers education and Indian ancestry or blood level. This difference becomes even more apparent when combining both parental categories into a single population. Although realizing that the resultant Chi-square statistic is obviously sensitive to both sample size and to the difference between sample variance and population variance, the strong difference noted among Creek parents between Indian ancestry or blood level and education is nonetheless still very significant.

Table VIII depicts Chi-square distribution for each educational level by Indian ancestry or blood level for the total sample population. As indicated in previous analysis regarding individual parental categories, educational levels K to 6 years and 12 years account for the bulk of the differences between parent blood quantum and education. Collectively, these two educational levels account for 67.2 percent of the total Chi-square value.

For the total sample population, individuals with zero Indian ancestry have a higher rate of completing 12 years of education than what one would theoretically expect. Similarly, fathers and mothers with 3/8 to 1/2 blood tend to have completed more post-secondary courses than what we would expect. However, full bloods (5/8 to 8/8) are under

TABLE VII

OBSERVED FREQUENCIES: TOTAL SAMPLE POPULATION

	Indian Blood Level								Total		
Education	0		1/8-1/4		3/8-1/2		5/8-8/8		Pct.	Row Totals	
K-6 years	a) (26)	9.9%	b) (16)	6.1%	c) (15)	5.7%	d) (205)	78.2%	100%	(262)	13.4%
7-9 years	e) (44)	11.6%	f) (38)	10.0%	g) (28)	10.4%	h) (268)	70.8%	100%	(378)	19.3%
10-11 years	i) (51)	14.7%	j) (33)	9.5%	k) (30)	8.7%	l) (231)	66.9%	100%	(345)	17.6%
12 years	m) (123)	19.8%	n) (48)	7.7%	o) (67)	10.8%	p) (382)	61.6%	100%	(620)	31.7%
Post HS+	q) (45)	12.8%	r) (31)	8.8%	s) (49)	13.9%	t) (227)	64.6%	100%	(351)	17.9%
Total Pct. Column Totals	(289)	14.7%	(166)	8.4%	(189)	9.7%	(1312)	67.0%	*	1956	100%

*Excludes no response category.

Source: Tables III and V.

TABLE VIII

CELL DESCRIPTION OF CHI-SQUARE ANALYSIS OF EDUCATIONAL AND INDIAN ANCESTRY OR BLOOD LEVEL FOR TOTAL SAMPLE POPULATION

Education	Cell	Blood Level	Observed Value	Expected Value	Observed-Expected	$O-E^2$	Chi-Square Value
K-6	a	0	26	38.71	-12.71	161.54	4.17
	b	1/8-1/4	16	22.24	-6.24	28.94	1.75
	c	3/8-1/2	15	25.32	-10.32	106.50	4.21
	d	5/8-8/8	205	175.74	29.26	856.15	4.87
7-9 years	e	0	44	55.85	-11.85	140.42	2.51
	f	1/8-1/4	38	32.08	5.92	35.05	1.09
	g	3/8-1/2	28	36.52	-8.52	72.59	1.99
	h	5/8-8/8	268	253.55	14.45	208.80	0.82
10-11 years	i	0	51	50.97	.03	.0009	0.00
	j	1/8-1/4	33	29.28	3.72	13.84	0.47
	k	3/8-1/2	30	33.34	-3.34	11.16	0.33
	l	5/8-8/8	231	231.41	-.41	.17	0.00

TABLE VIII (Continued)

Education	Cell	Blood Level	Observed Value	Expected Value	Observed-Expected	$O-E^2$	Chi-Square Value
12 years	m	0	123	91.61	33.39	1114.89	12.17
	n	1/8-1/4	48	52.62	-4.62	21.34	0.41
	o	3/8-1/2	67	59.91	7.09	50.27	0.84
	p	5/8-8/8	382	415.87	-33.87	1147.18	2.76
Post secondary	q	0	45	51.86	-6.86	47.06	0.91
	r	1/8-1/4	31	29.79	1.21	1.46	0.05
	s	3/8-1/2	49	33.92	15.08	227.41	6.70
	t	5/8-8/8	227	235.44	-8.44	71.23	0.30

$X^2 = 46.35$; df - 12; $p = .0001$.

Source: Tables II and V.

educated at the 12 year level and post-secondary level than what one would expect. A particular marked discrepancy exists at the 12+ year level ($X^2 = 2.76$).

A disproportionate share of the total sample population achieving only six years of education or less were found to be full bloods (Table VII). Of the 13.4 percent Creek parents completing up to six years of school, 78.2 percent indicated they were full blood (or 8/8). Of all parents surveyed, 50.3 percent indicated they had completed at least 12 years or more of school compared to 49.7 percent who did not.

A smaller proportion (10.9 percent) of Creek mothers were found in the K to 6 educational category than Creek fathers (16.3 percent). Of the total sample population, 13.4 percent indicated they had completed six years of school or less.

Creek fathers tend to participate (or avail themselves of the opportunity to participate) more in education beyond high school. Of all Creek mothers surveyed, 15.6 percent indicated some post-secondary education participation, compared to 20.7 percent for Creek fathers (Tables II and V). Of the total sample population, 17.9 percent indicated post-secondary participation (Table VII).

Figure 2 and Table VIII depict a graphic comparison of Chi-square values regarding education and Indian blood level for Creek mothers, fathers, and total population. The situation in Figure 2 and Table VIII depicts a significant difference between Indian ancestry or blood level and education for Creek Indian mothers than fathers, and an even stronger relationship when comparing all tribal parents surveyed.

The particularly strong differences between Indian blood level and education among parents surveyed should indicate the importance to tribal

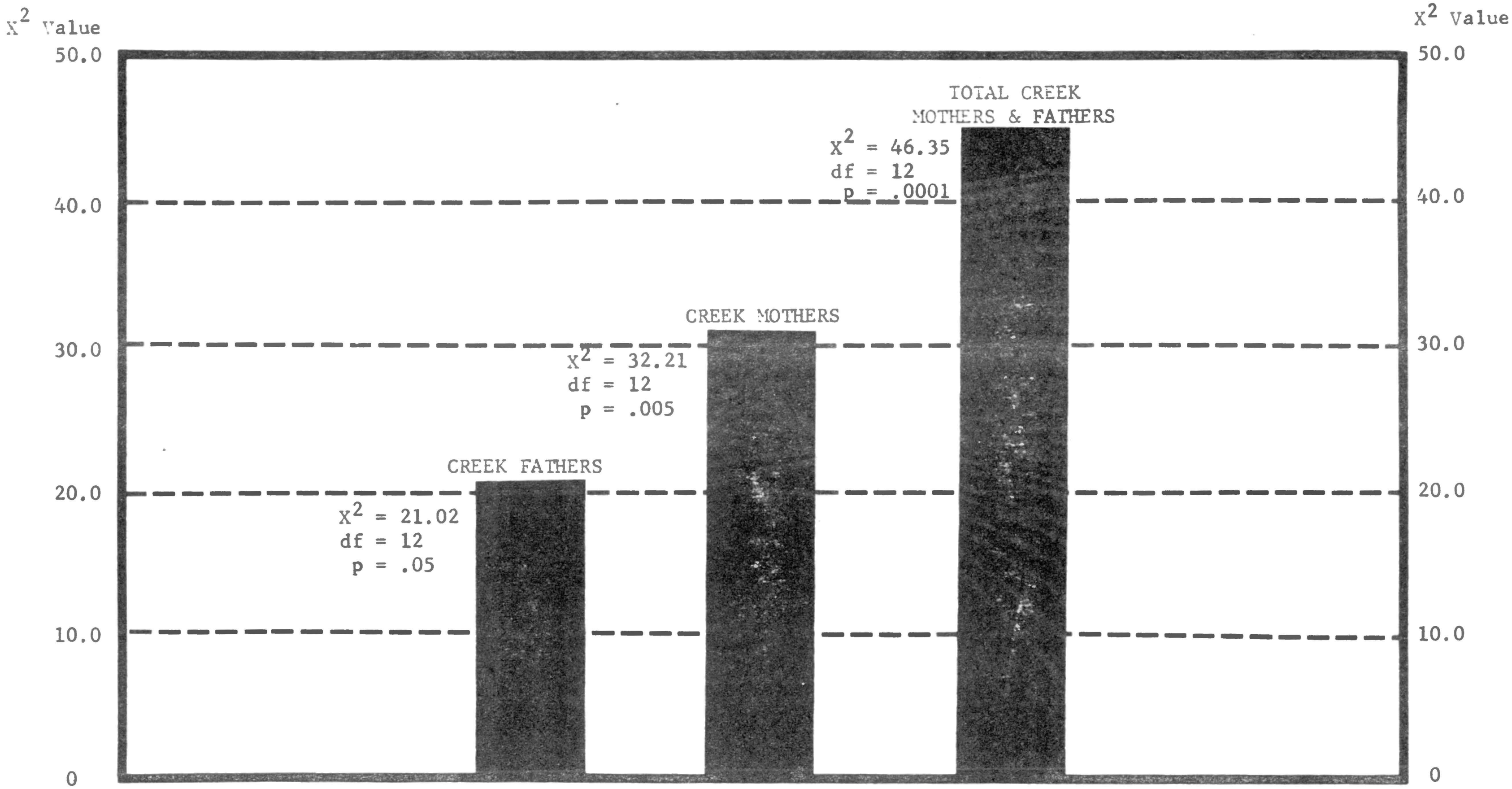

Figure 2. Summary Comparison of Chi-Square Values for Father, Mother, and Total Sample Population for Education by Indian Blood Level

planners of being able to delineate Indian target populations for educational program delivery through precise ethnic identification. As such, the higher the individual parent Indian ancestry or blood level, the greater the priority should be for educational program participation. A recommended policy would be to encourage those individuals who are close to Indian culture (i.e., by virtue of ancestry) to receive the major impetus and priority regarding tribal educational program participation.[3]

Figure 2 further indicates that the differences between Indian blood level and education could be expected mathematically to occur solely through chance variations more than once, but less than five times, in 100 occasions for Creek fathers; less than five times in 1,000 occasions for Creek mothers; and less than one time in 10,000 occasions for total Indian parents surveyed. The Chi-square value and significance level for each category at 12 degrees of freedom is as follows: (1) Creek fathers $X^2 = 21.02$, $p = .05$; (2) Creek mothers $X^2 = 32.21$, $p = .005$; (3) total sample population $X^2 = 46.35$, $p = .001$. Thus the null hypothesis, that there is no significant difference between the total Creek Indian parent population and education by Indian ancestry or blood level, is rejected.

This statistical difference may be attributed to increased access to educational facilities (secondary and post-secondary) by Creek parents with one-quarter blood or more. Furthermore, these individuals may be more aware or sensitive to education as a vehicle to improve economic status.

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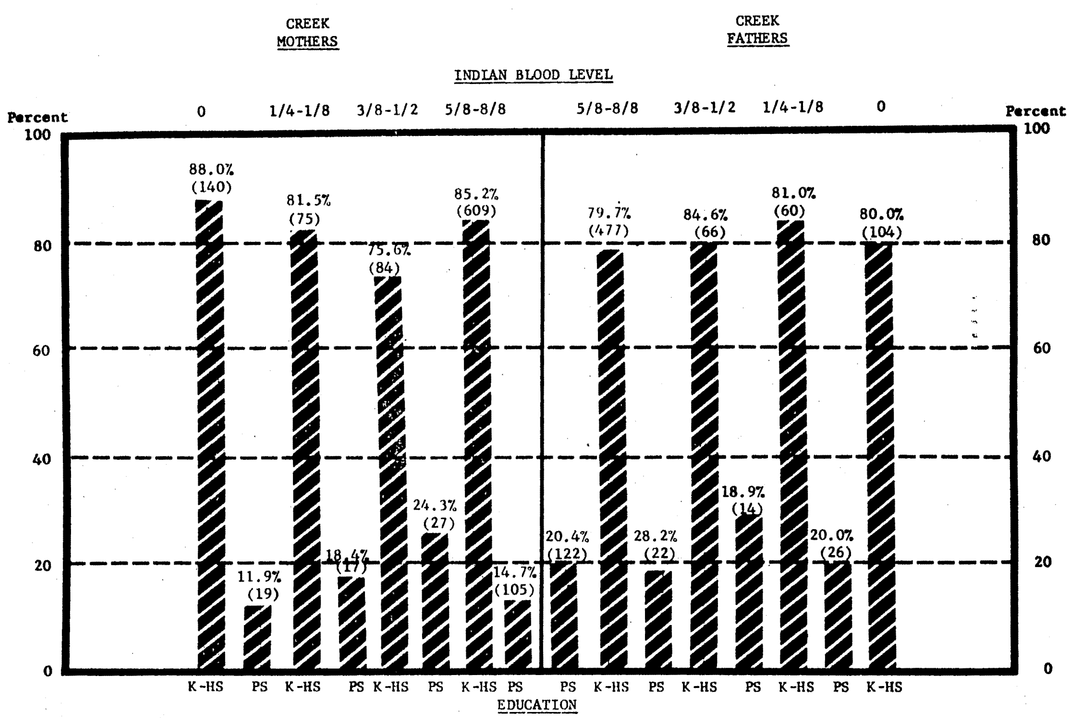
[3]Warheit, Bell, and Schwamk, pp. 62-70.

Several factors may contribute to this statistical disparity in level of education among Creek parents greater than one-half blood. One factor may be that Indian people in rural areas may not place as high a value on post-secondary education. Another factor could be the ability of urban centers to provide a more comprehensive job market for persons with post-secondary education than rural areas. Urban centers also may encourage an environment which gives greater impetus to the value of a vocation or profession requiring post-secondary education. Further, some individual Creek parents may seek out a post-secondary education in order to be more effective within the American Indian movement.

Descriptive Analysis: Creek Mothers and Fathers Versus Education and Indian Blood Level

In Figure 3, comparison is made of the total number of Creek mothers and fathers surveyed who have completed high school or less with those completing one year or more of post-secondary education by blood level. Eighty-eight percent of the Creek mothers with no Indian blood level completed high school or less, while 80 percent of Creek fathers with no Indian blood level completed high school or less. (Each graph may not total 100 percent due to rounding.)

The next highest group were those Creek mothers with a quantum blood level of 5/8 to 8/8 in which group 85.2 percent achieved high school education or less. Creek fathers with a quantum blood level of 3/8 to 1/2 achieved the highest percentage of a high school education or less at 84.6 percent.



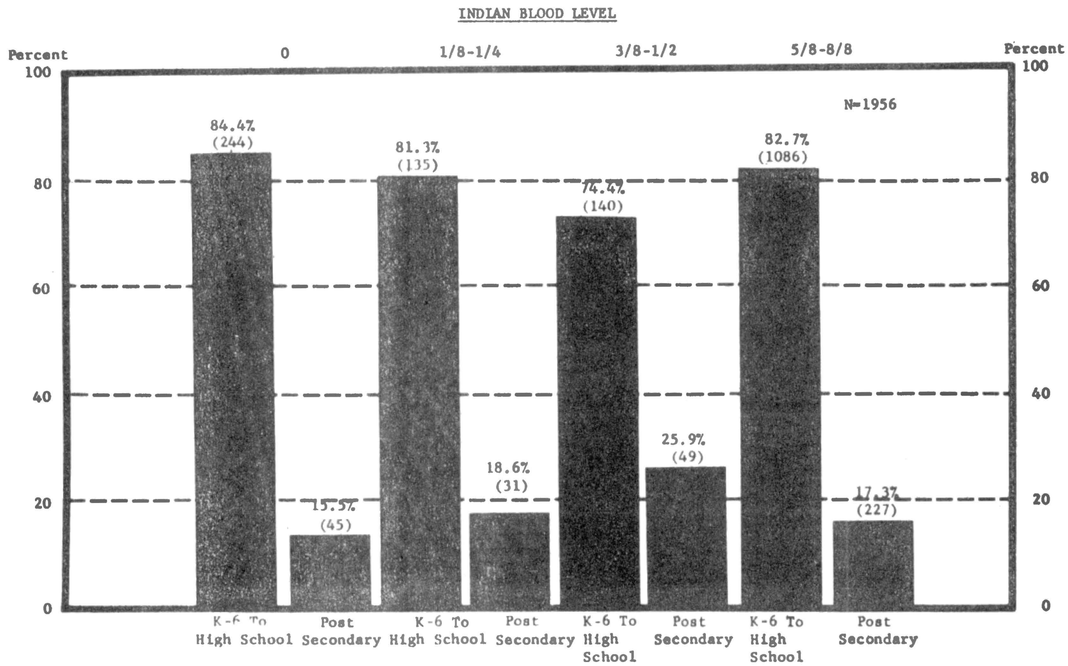
Source: Field Survey, Creek Nation, March-August, 1975.

Figure 3. Comparison of Total Number of Creek Mothers and Fathers Who Have Completed High School or Less with Those Completing One Year or More of School Beyond High School by Blood Level

Of those Creek mothers achieving the level of post-secondary education by quantum blood level, those mothers with a blood level of 3/8 to 1/2 achieved the highest, or 24.3 percent. The lowest percentages were those with no quantum blood level. Among Creek fathers achieving the level of post-secondary education, the greatest percentages were those with a blood level of 3/8 to 1/2. The lowest quantum blood level achieving a post-secondary education was 1/4 to 1/8 at 18.9 percent.

Figure 4 compares the total number of Creek mothers and fathers surveyed who have completed high school or less with those completing one year or more of school beyond high school by Indian blood level.

The highest percentage, 84.4 percent, of Creek mothers and fathers who completed high school or less were those with no Indian blood level. They were followed by those with a blood level of 5/8 to 8/8 at 82.7 percent. Next were those with a blood level of 1/8 to 1/4 at 81.3 percent. The lowest educationally achieving group was those with a blood level of 3/8 to 1/2 at 74.4 percent.



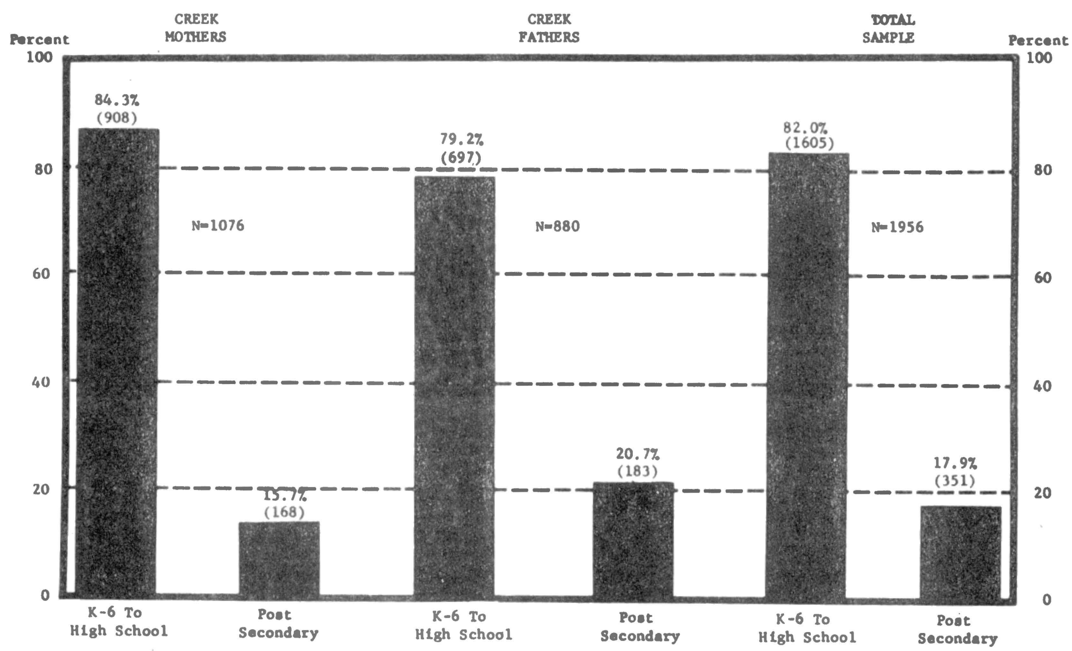
Source: Field Survey, Creek Nation, March-August, 1975.

Figure 4. Comparison of Total Number of Creek Mothers and Fathers Surveyed Who Have Completed High School or Less with Those Completing One Year or More of High School by Indian Blood Level

The group with the highest percentage of individuals completing one or more years beyond high school were those with a quantum blood level of

3/8 to 1/2 at 25.9 percent. Next were those with a quantum blood level of 1/8 to 1/4 at 18.6 percent. The group with the lowest percentage were those with no Indian blood level at 15.5 percent.

Figure 5 represents a comparison of those Creek mothers and fathers surveyed who have completed a high school education or less with those completing one year or more of school beyond high school. Of the total sample, 82 percent of the population received a high school education or less, and 17.9 percent completed one or more years of post-secondary education.

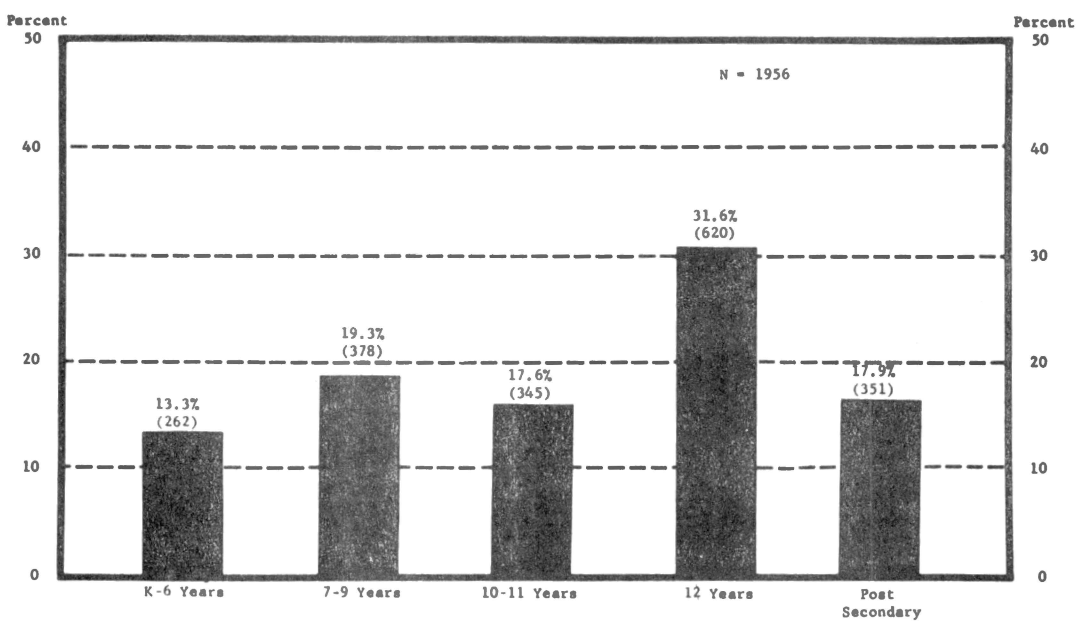


Source: Field Survey, Creek Nation, March-August, 1975.

Figure 5. Comparison of Those Creek Mothers and Fathers Surveyed Who Have Completed a High School Education or Less with Those Completing One Year or More of School Beyond High School

Eight-four percent of Creek mothers (84.3 percent) received a high school education or less, compared with 82 percent of Creek fathers achieving in this same level. There was a five percent disparity between the groups in achievement of post-secondary education. Creek fathers registered 20.7 percent, while 15.7 percent of Creek mothers had received post-secondary education; of the total sample, 17.9 percent received a post-secondary education.

Figure 6 illustrates the total sample population's educational level by number of school years completed. For those completing 12 years of school or less, the highest percentage (31.6 percent) completed 12 years of schooling.

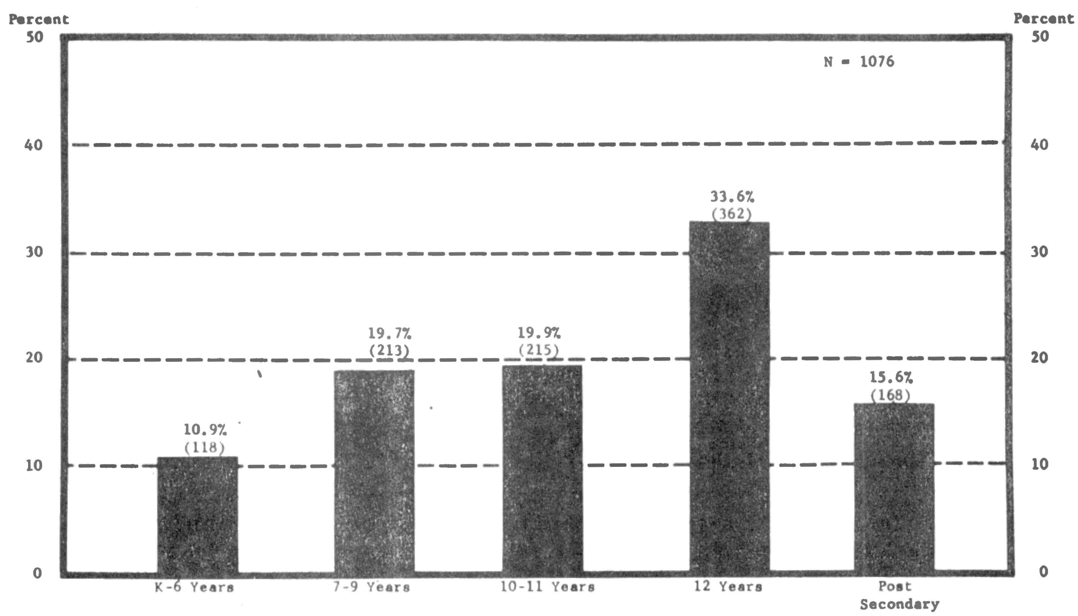


Source: Field Survey, Creek Nation, March-August, 1975.

Figure 6. Total Sample Population Educational Level

The next greatest percentage of school years completed was 7 to 9 years of schooling at 19.3 percent. Those receiving post-secondary education included 17.9 percent of the population, followed by 17.6 percent of the sample receiving 10 to 11 years of schooling. Those achieving an educational level of kindergarten through six years contained the smallest percentage of the population at 13.3 percent.

Figure 7 relates the comparison of the total number of Creek mothers surveyed by educational levels kindergarten through six to post-secondary at all quantum blood levels. Significantly, 69.1 percent of the total sample of Creek mothers achieved an educational level of 10 years or more. Of this group, 49.2 percent received 12 or more years of schooling.

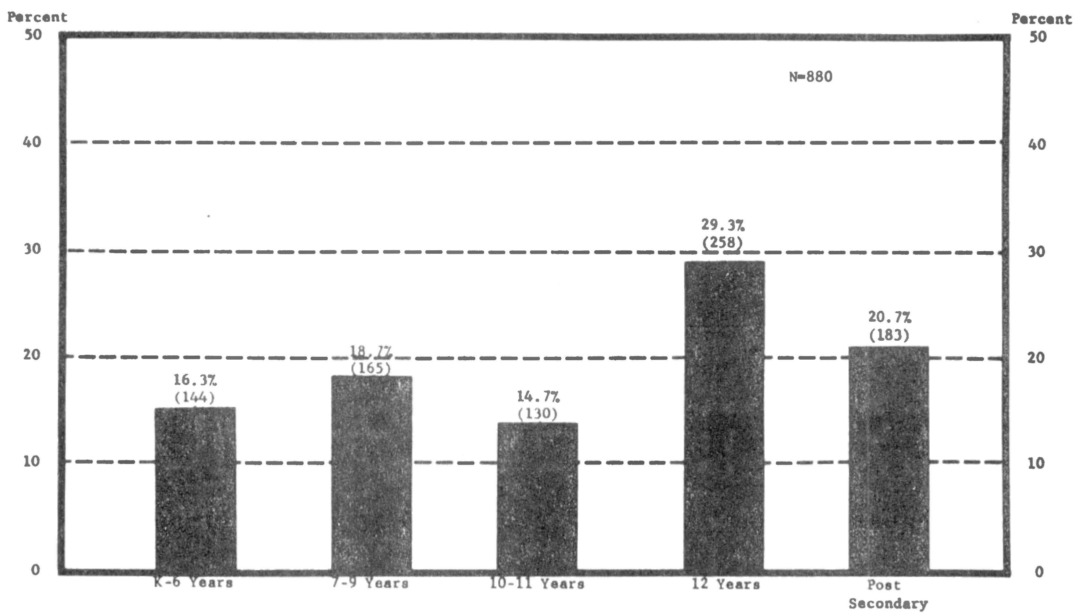


Source: Field Survey, Creek Nation, March-August, 1975.

Figure 7. Comparison of Total Number of Creek Mothers Surveyed by Educational Levels K-6 to Post-Secondary (All Blood Levels)

Those receiving six years or less of schooling represented 10.9 percent of the population. Seven to nine years of schooling represented 19.7 percent of the population surveyed of Creek mothers.

Figure 8 compares the total number of Creek fathers surveyed by educational levels kindergarten through six to post-secondary at all quantum blood levels. Fifty percent of the population received an educational level of 12 years or more of schooling. The percentage of those completing high school was 29.3 percent, with 20.7 percent receiving post-secondary education. In looking at those with 10 or more years of schooling, 64.7 percent of the population was included.

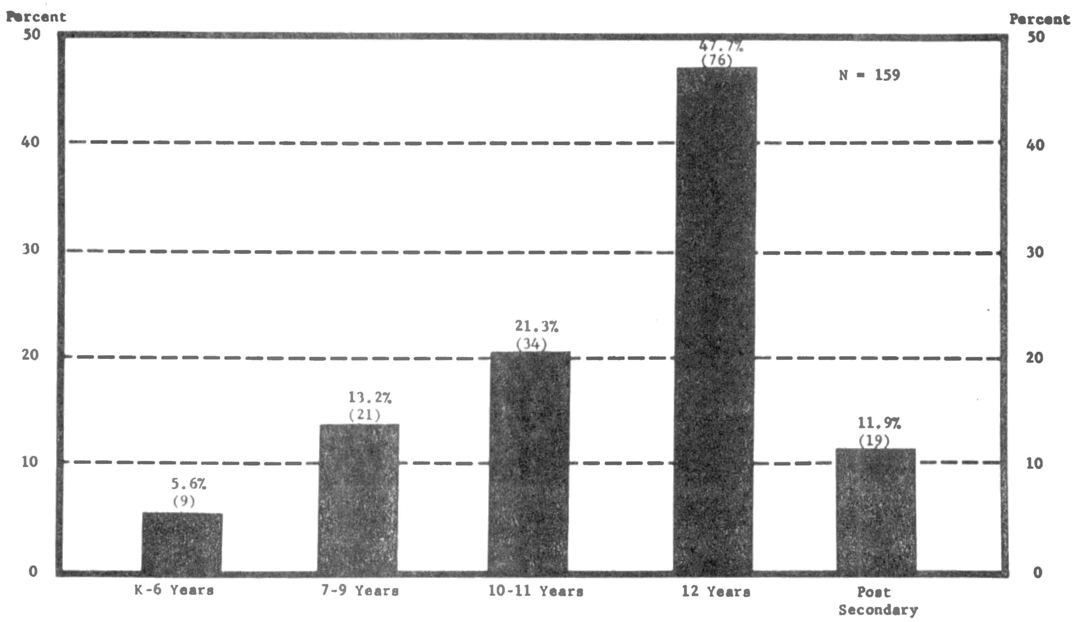


Source: Field Survey, Creek Nation, March-August, 1975.

Figure 8. Comparison of Total Number of Creek Fathers Surveyed by Educational Levels K-6 to Post-Secondary (All Blood Levels)

Thirty-five percent of the Creek fathers surveyed received nine or less years of schooling. The percentage of those with less than six years was 16.3 percent and for seven to nine years of education, 18.7 percent.

Figure 9 illustrates the comparison of the total number of Creek mothers surveyed with no Indian blood by education. When examining this graph, it is clear that education peaks at 12 years of schooling. Within this population of Creek mothers, 47.7 percent are included.



Source: Field Survey, Creek Nation, March-August, 1975.

Figure 9. Comparison of Total Number of Creek Mothers Surveyed with No Indian Blood by Education

This may be compared with the percentage of 33.6 percent from all Creek mothers of all blood levels surveyed (Figure 7), a more dramatic comparison would be with those Creek mothers with an Indian blood level of 5/8 to 8/8 in which only 30.9 percent achieved 12 years of schooling.

Further, this disparity may be seen with those completing up to six years of school. Of those mothers with no Indian blood, 5.6 percent were within this category, as opposed to 10.9 percent from all blood levels and 12.8 percent from mothers with an Indian blood level of 5/8 to 8/8.

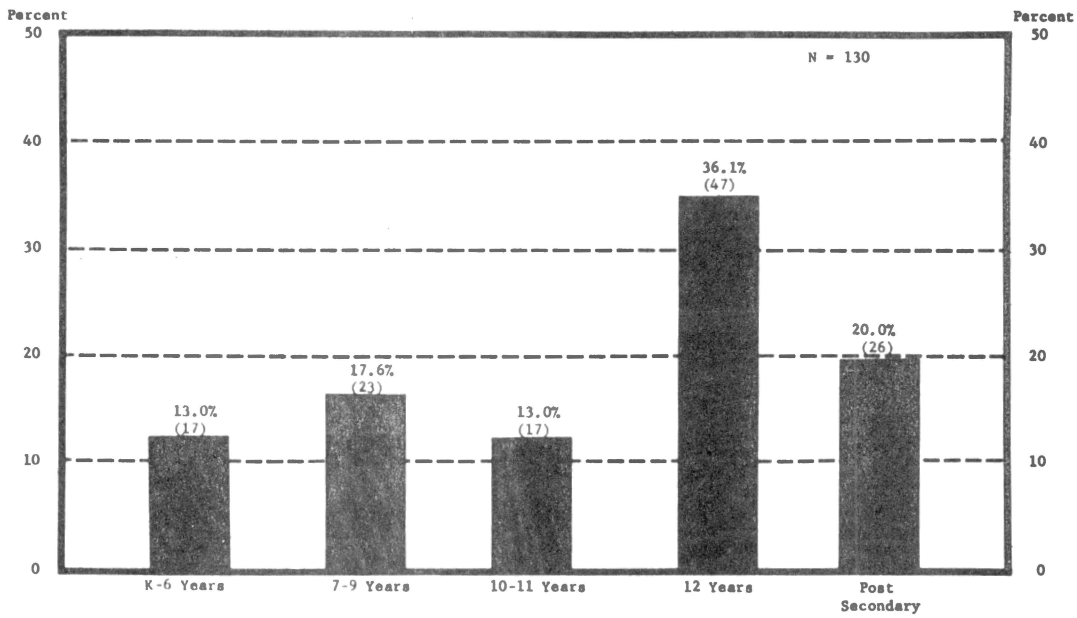
Of those mothers in Figure 9, 13.2 percent completed 7 to 9 years of schooling, compared to 19.7 percent of the total population, and 21.7 percent of those with a blood level of 5/8 to 8/8. The figure was more proportionate among the three populations for those completing 10 to 11 years of education. This included 21.3 percent for those with no Indian blood, 19.9 percent for those from all blood levels, and 19.7 percent for those with 5/8 to 8/8 Indian blood level.

Curiously, only 11.9 percent of Creek mothers with no Indian blood received post-secondary education. Within this category, 15.6 percent of all Creek mothers surveyed received post-secondary education, and 14.7 percent of those Creek mothers with an Indian blood level of 5/8 to 8/8.

Figure 10 is a comparison of the total number of Creek fathers surveyed with no Indian blood by education. As was true of Creek mothers with no Indian blood (Figure 9), this specific population peaked in the category of 12 years of education completed with 36.1 percent included.

When compared with other populations, this percentage is slightly higher than those Creek fathers of all blood levels (29.3 percent), and

9.2 percent higher than Creek fathers with an Indian blood level of 3/8 to 8/8. Thirteen percent of Creek fathers with no Indian blood completed up to six years of school, as compared to 18.8 percent of those Creek fathers with 5/8 to 8/8 Indian blood level.



Source: Field Survey, Creek Nation, March-August, 1975.

Figure 10. Comparison of Total Number of Creek Fathers Surveyed with No Indian Blood by Education

Little variation exists within the category of 7 to 9 years of schooling completed. Creek fathers with no Indian blood included 17.6 percent of their population in this category, as compared to 18.7 percent from all Indian blood levels, and 18.8 percent from 5/8 to 8/8 Indian blood levels. This is true also within the category of 10 to 11 school years completed. Fathers with no Indian blood included 13.0

percent of the population, as opposed to 14.7 percent from all fathers, and 15.0 percent from those with a 5/8 to 8/8 Indian blood level.

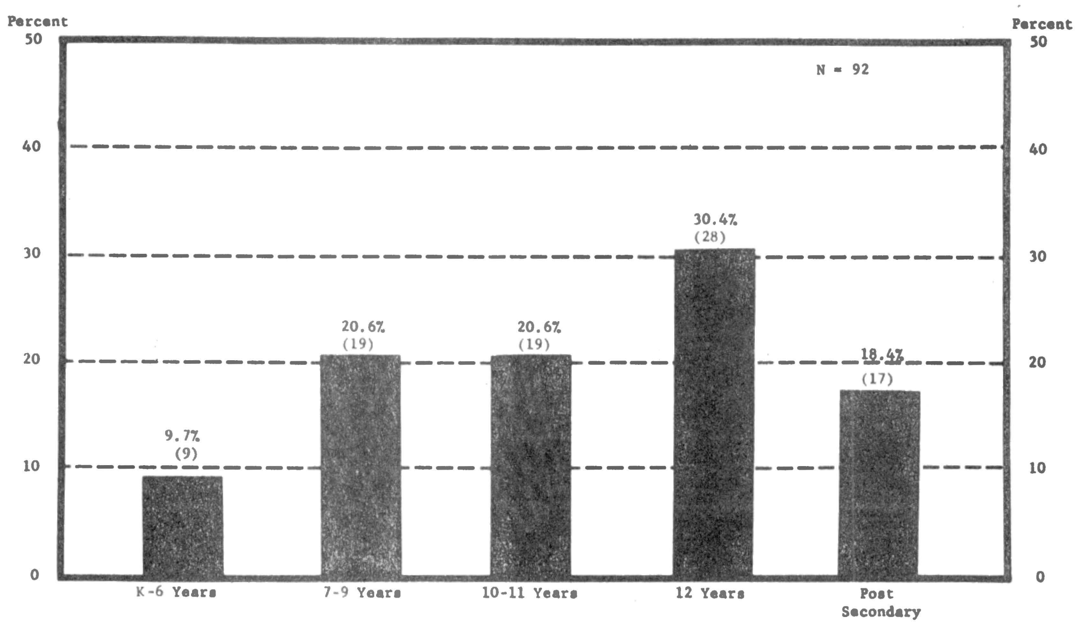
Minimal variation exists within the category of post-secondary education. Those surveyed in Figure 10 with no Indian blood included 20.0 percent of the population, as compared with 20.4 percent of Creek fathers with a blood level of 5/8 to 8/8, and 20.7 percent of those from all blood levels.

Figure 11 depicts the total number of Creek mothers surveyed with 1/8 to 1/4 Indian blood by education. The largest percentage of those completing any one educational level were those completing 12 years at 30.4 percent. This may be compared with the total number of Creek mothers at any blood level (Figure 7), in which 33.6 percent of the total population received a high school education.

Creek mothers scored 20.6 percent each with the category of 7 to 9 years and 10 to 11 years. This was in comparison to 19.7 percent and 19.9 percent on the total number of Creek mothers at any blood level. The survey indicated those Creek mothers with 1/8 to 1/4 Indian blood who had received post-secondary education at 18.4 percent. This was 2.8 percent higher than the percentage of all Creek women regardless of blood level.

Creek mothers (1/8 to 1/4 blood level) with kindergarten to six school years included 9.4 percent of the population. In Figure 7, the total number of Creek mothers, regardless of blood level, who had attained this educational level were 10.9 percent of the population.

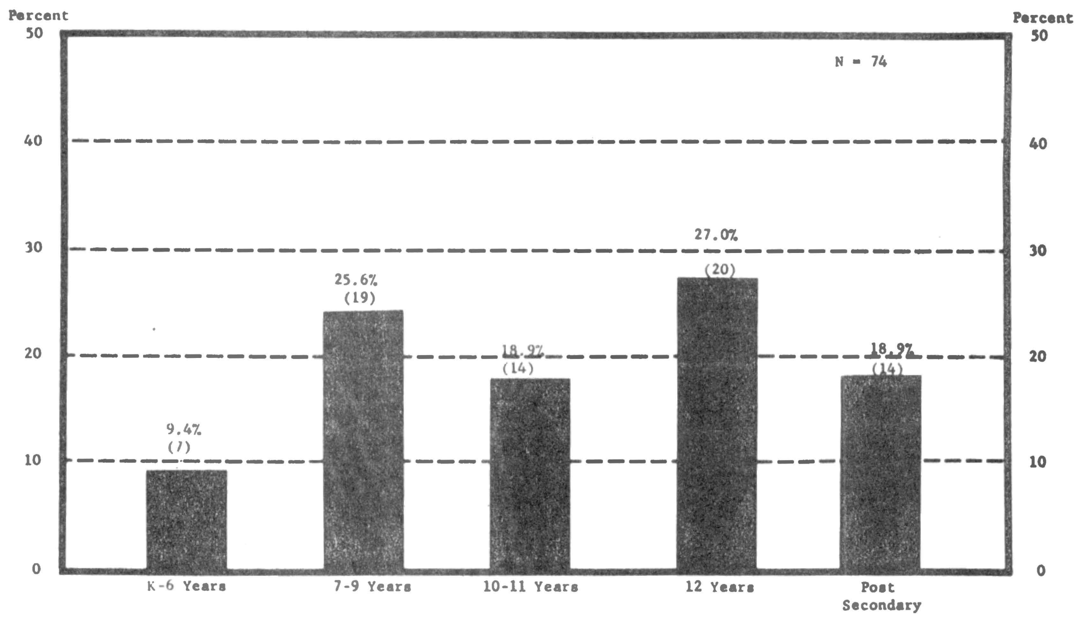
Figure 12 illustrates the comparison of the total number of Creek fathers surveyed with an Indian blood level of 1/8 to 1/4 by education. The highest percentage of Creek fathers fell in the category of 12 years of education at 27 percent. Post-secondary achievers included 18.9 percent of the population, so that the high school graduates and post-secondary groups comprise 45.9 percent of the population. In Figure 8, which illustrates the educational level of the total number of Creek fathers regardless of blood level, these two groups comprised 50 percent of the population.



Source: Field Survey, Creek Nation, March-August, 1975.

Figure 11. Comparison of Total Number of Creek Mothers Surveyed with 1/4 to 1/8 Indian Blood by Education

Those completing 10 to 11 years of education included 18.9 percent of the population, while the survey including all blood levels was 14.7 percent. The greatest disparity between the 1/4 to 1/8 blood level and the total population of Creek fathers was in those who received 7 to 9 years of school. Those with a blood level of 1/4 to 1/8 included 25.6 percent of the population, while the total population included 18.7 percent.

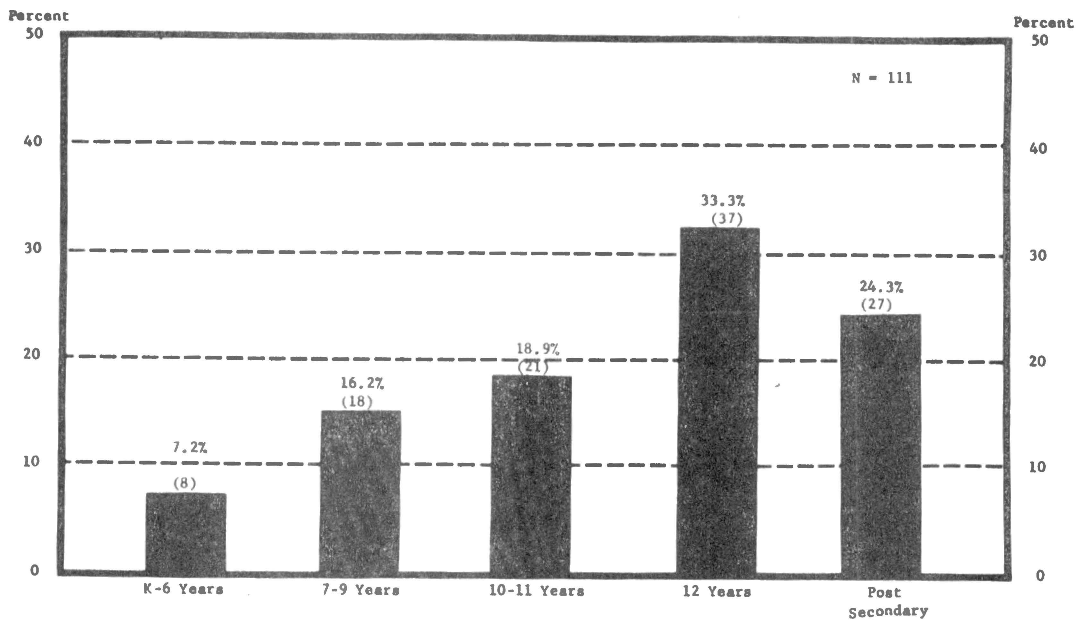


Source: Field Survey, Creek Nation, March-August, 1975.

Figure 12. Comparison of Total Number of Creek Fathers Surveyed with an Indian Blood Level of 1/8 to 1/4 by Education

Creek fathers with an Indian blood level of 1/4 to 1/8 and with an educational level of kindergarten to six years included 9.4 percent of the population, while the total population of Creek fathers included 16.3 percent of the population.

Figure 13 is a comparison of the total number of Creek mothers surveyed with 3/8 to 1/2 Indian blood by education. Within this group, 57.6 percent of Creek mothers had attained a high school education or better. For the total number of Creek mothers, regardless of blood level, 49.2 percent of the total fell within this educational range (see Figure 7).



Source: Field Survey, Creek Nation, March-August, 1975.

Figure 13. Comparison of Total Number of Creek Mothers Surveyed with 3/8 to 1/2 Indian Blood by Education

Of those Creek mothers with 3/8 to 1/2 blood, 24.3 percent attained a post-secondary education, as opposed to 15.6 percent of those from all blood levels. For those achieving a high school education, 33.3 percent of the Creek mothers were included with a 3/8 to 1/2 blood level, while it was 33.5 percent for those from all blood levels.

Within the category of 10 to 11 school years completed, 18.9 percent of the Creek mothers were included. From the total sample of all blood levels, 19.9 percent were included. For those achieving 7 to 9 years of school, 16.2 percent of this population were included; this was compared to the 19.7 percent included in the total sample of all blood levels. Creek mothers with a sixth grade education, or less, comprised 7.2 percent of the population with a blood level of 3/8 to 1/2. Creek mothers of all blood levels with a sixth grade education or less comprised 10.9 percent of the population.

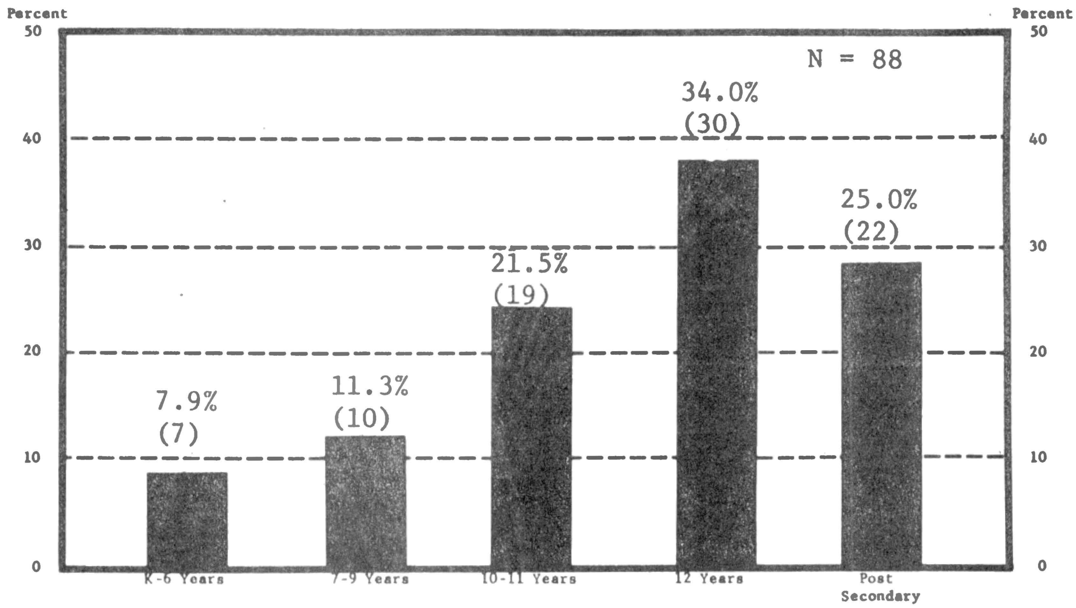
Figure 14 illustrates the comparison of the total number of Creek fathers surveyed with an Indian blood level of 3/8 to 1/2 by education. This illustration clearly shows a major difference between those of the 3/8 to 1/2 Indian blood level to the total number of Creek fathers of all blood levels (see Figure 8).

Within this specific blood level, 66.6 percent of the population attained a high school or post-secondary education. This is compared to 50 percent of the total population of Creek fathers from all blood levels.

Creek fathers with a blood level of 3/8 to 1/2 included 28.2 percent of their population in post-secondary education, and 38.4 percent in completing 12 years of school. Among the total population, the figures were 20.7 percent and 29.3 percent, respectively.

Within this specific population of Creek fathers, 24.3 percent completed 10 to 11 years of education, as opposed to 14.7 percent of the total population from all blood levels. This is a 9.6 percent difference. Creek fathers with the 3/8 to 1/2 blood level included

12.8 percent of the population with 7 to 9 years of schooling, as opposed to those from all blood levels that included 18.7 percent of the population.

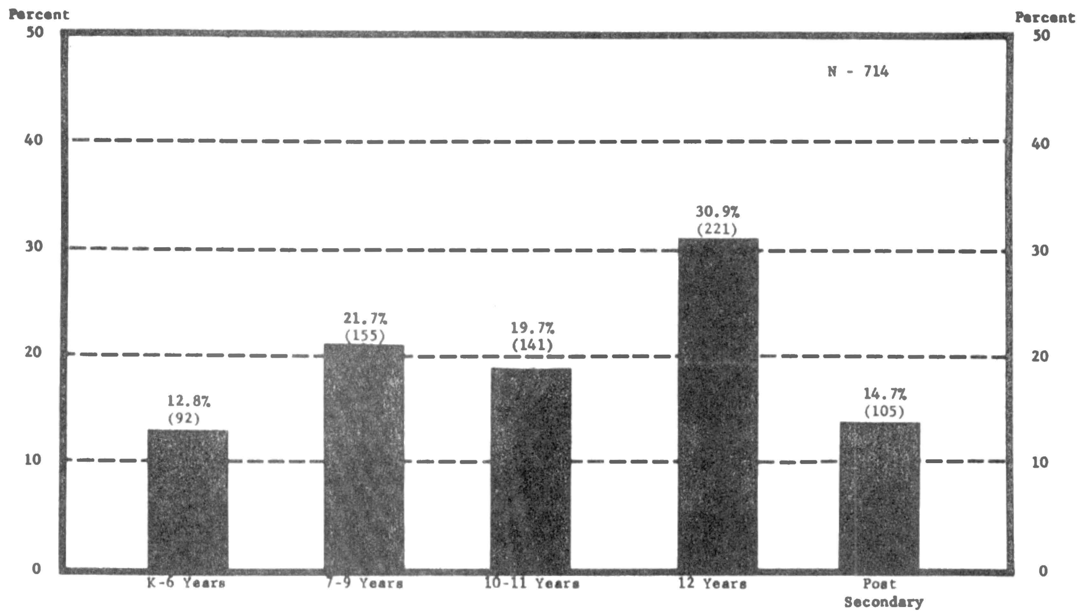


Source: Field Survey, Creek Nation, March-August, 1975.

Figure 14. Comparison of Total Number of Creek Fathers Surveyed with an Indian Blood Level of 3/8 to 1/2 by Education

Among those Creek fathers with an Indian blood level of 3/8 to 1/2, 8.9 percent of the population had attained up to six years of schooling. For the total population surveyed, this included 16.3 percent of the population. The percent of Creek fathers with a blood level of 3/8 to 1/2 who received a kindergarten through nine years of schooling includes 21.7 percent of the population, as opposed to 35 percent of the total population from all blood levels.

Figure 15 graphically depicts a comparison of the total number of Creek mothers surveyed with 5/8 to 8/8 Indian blood by education. Seven hundred fourteen respondents were included in this table.



Source: Field Survey, Creek Nation, March-August, 1975.

Figure 15. Comparison of Total Number of Creek Mothers Surveyed with 5/8 to 8/8 Indian Blood by Education

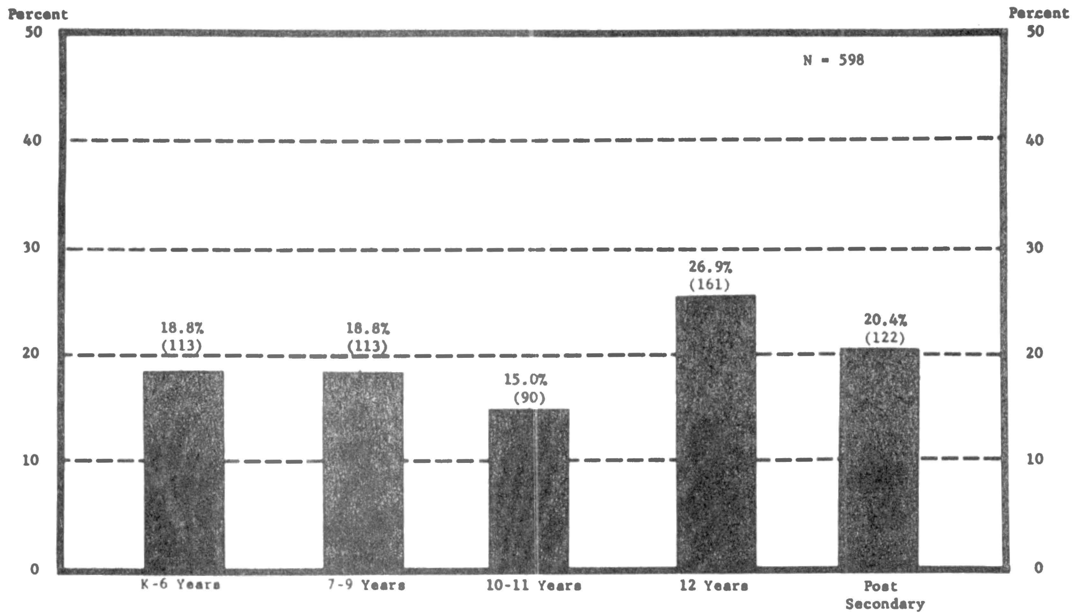
Of this group with an Indian blood level above 5/8, 221 (or 30.9 percent), completed 12 years of education. This group comprised the largest population in any one category. In this specific population (5/8 to 8/8 Indian blood), there appears to be a great deal of uniformity when compared with Figure 7, which depicts the educational level of the total number of Creek mothers by all blood levels.

Among those mothers in Figure 15, 12.8 percent completed up to six years of schooling, as opposed to 10.9 percent of the general population. Of those completing 7 to 9 years of education, 21.7 percent of this group was included, as compared to 19.7 percent from all Creek mothers. There was less difference shown in the category of 10 to 11 years completed, with those with 5/8 to 8/8 blood including 19.7 percent of that population, and 19.9 percent of the general population. The 30.9 percent of Creek mothers of this blood level completing 12 years of schooling compared to 33.6 percent of those from all blood levels.

Regarding post-secondary education, 14.7 percent of those in Figure 15 were in this category. This is compared to 15.6 percent of those mothers from all blood levels.

Figure 16 is a comparison of the total number of Creek fathers surveyed with an Indian blood level of 5/8 to 8/8 by education. It may be noted that within this particular blood level, with the exception of those completing 12 years of school, the remainder of this population is proportionately distributed through all other educational levels.

The category of those completing up to six years of schooling, 18.8 percent, may be compared to the total population of Creek fathers who within this same category included 16.3 percent of the population. The two populations, those with a 5/8 or above Indian blood level and the total number of Creek fathers, had approximately the same percentage of individuals completing 7 to 9 years of school. They were 18.8 percent and 18.7 percent, respectively. This is also true of those completing 10 to 11 years of schooling, where again they ranked 15.0 percent and 14.7 percent respectively.



Source: Field Survey, Creek Nation, March-August, 1975.

Figure 16. Comparison of Total Number of Creek Fathers Surveyed with an Indian Blood Level of 5/8 to 8/8 by Education

Of those Creek fathers with an Indian blood level of 5/8 or more, 26.9 percent completed 12 years of school. This may be compared to 29.3 percent of the general population. Those completing post-secondary education comprised 20 percent of this population of Creek fathers, as compared to a similar figure of the total population of Creek fathers in which this category comprised 20.7 percent.

Cartographical Analysis: Parental Education and Indian Blood Level

Parental Indian Blood Level

Figures 17 through 20 depict Creek parents' educational and Indian

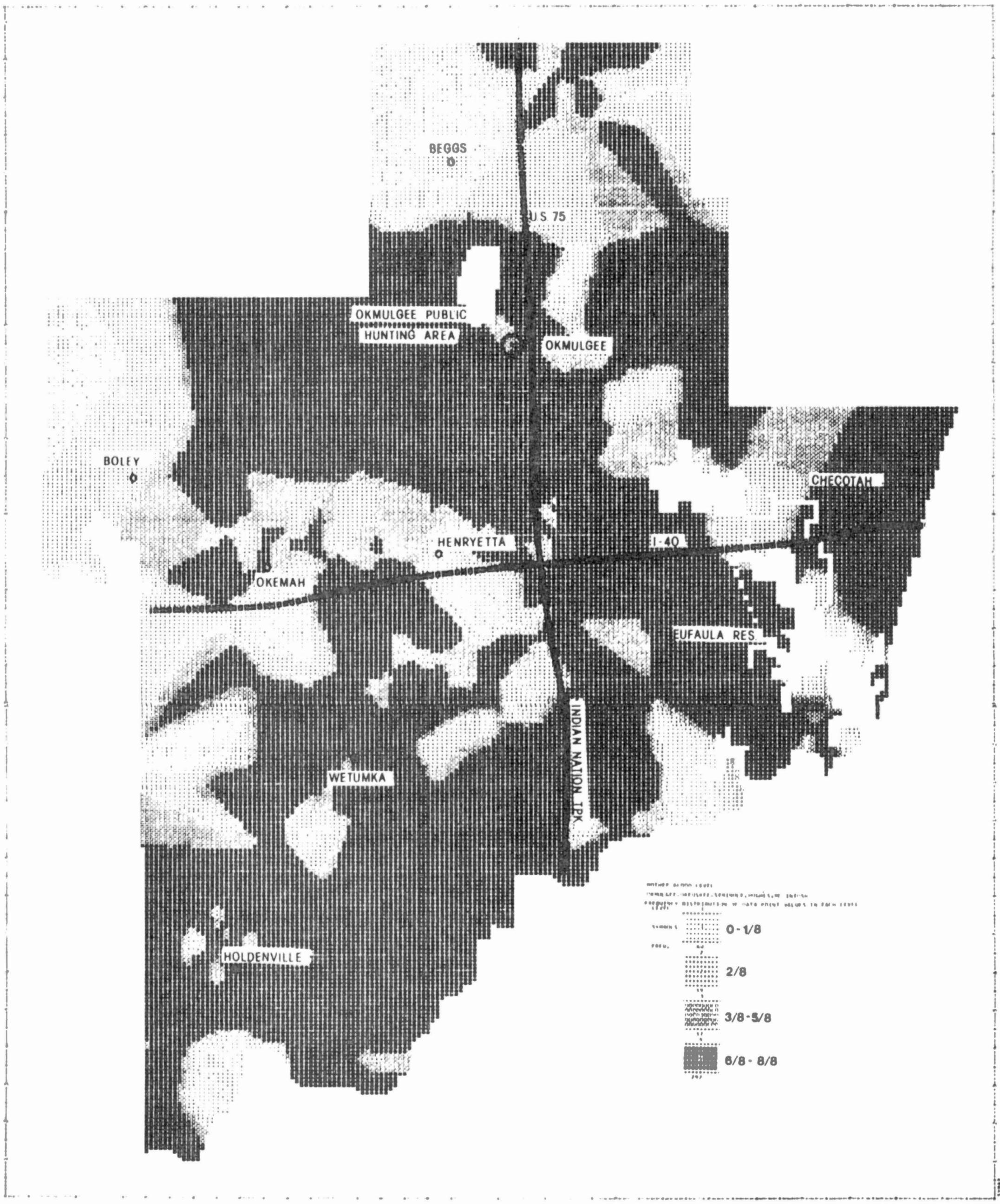


Figure 17. Mother Blood Level--Southern Region

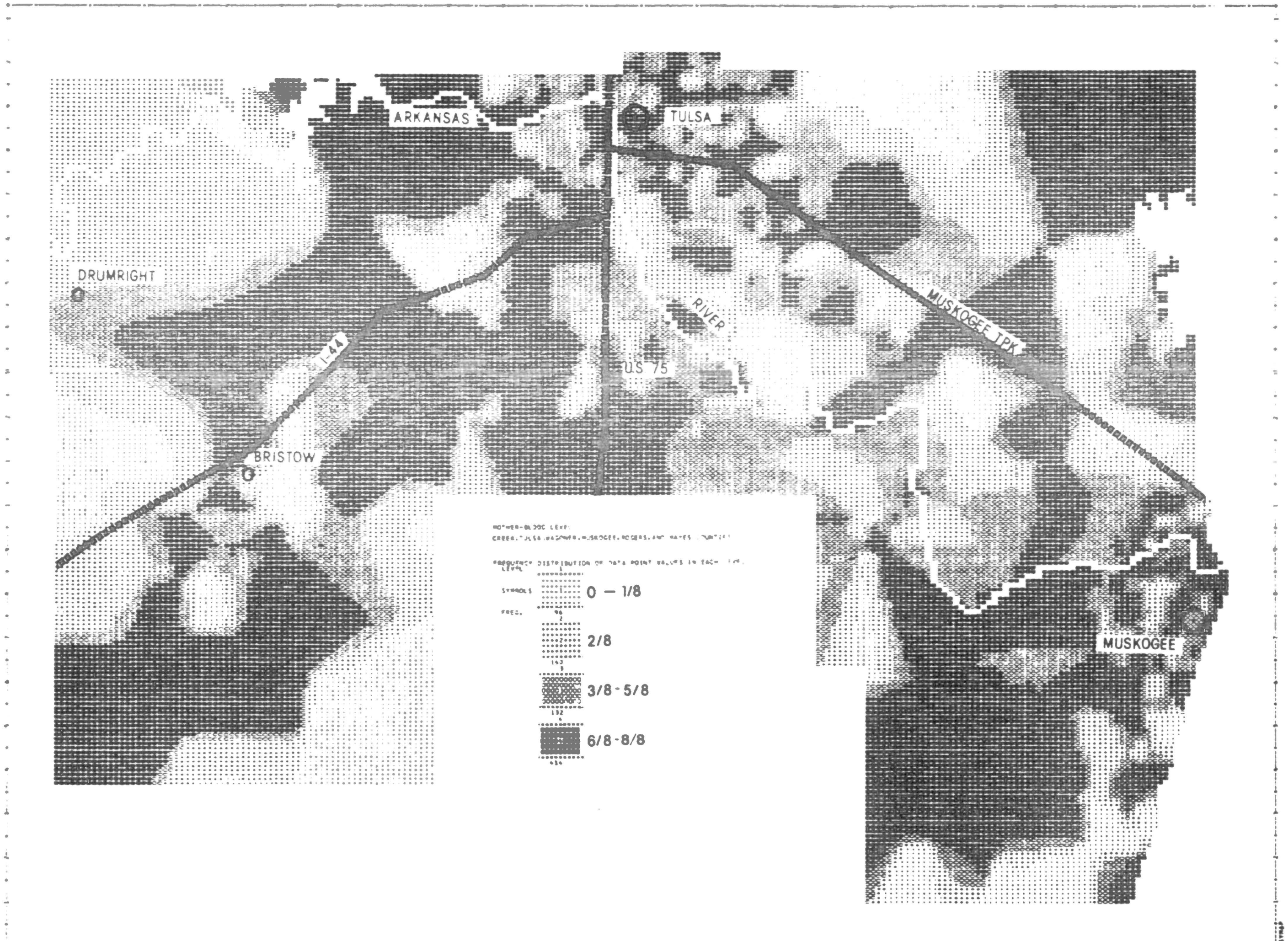


Figure 18. Mother Blood Level--Northern Region

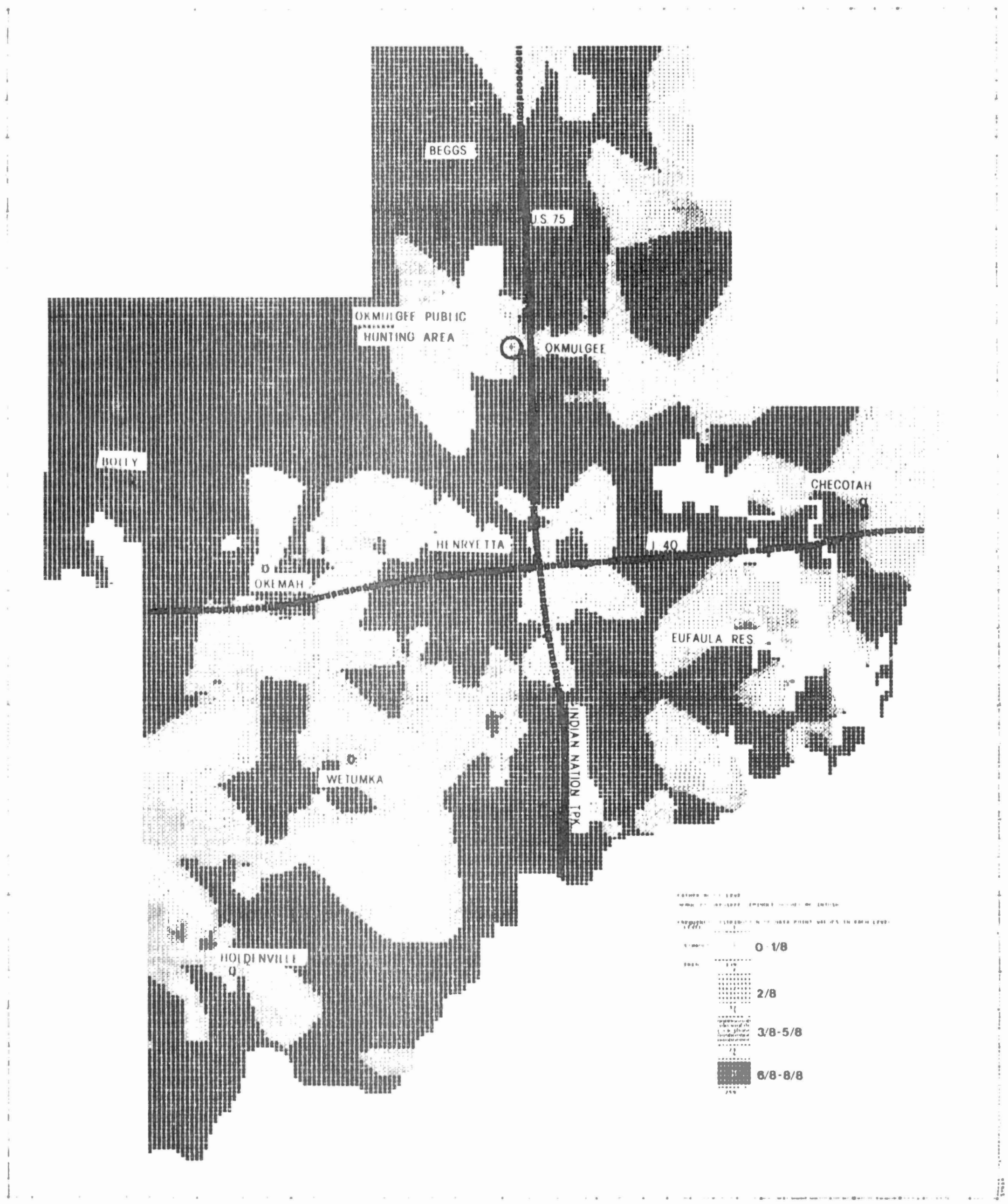


Figure 19. Father Blood Level--Southern Region

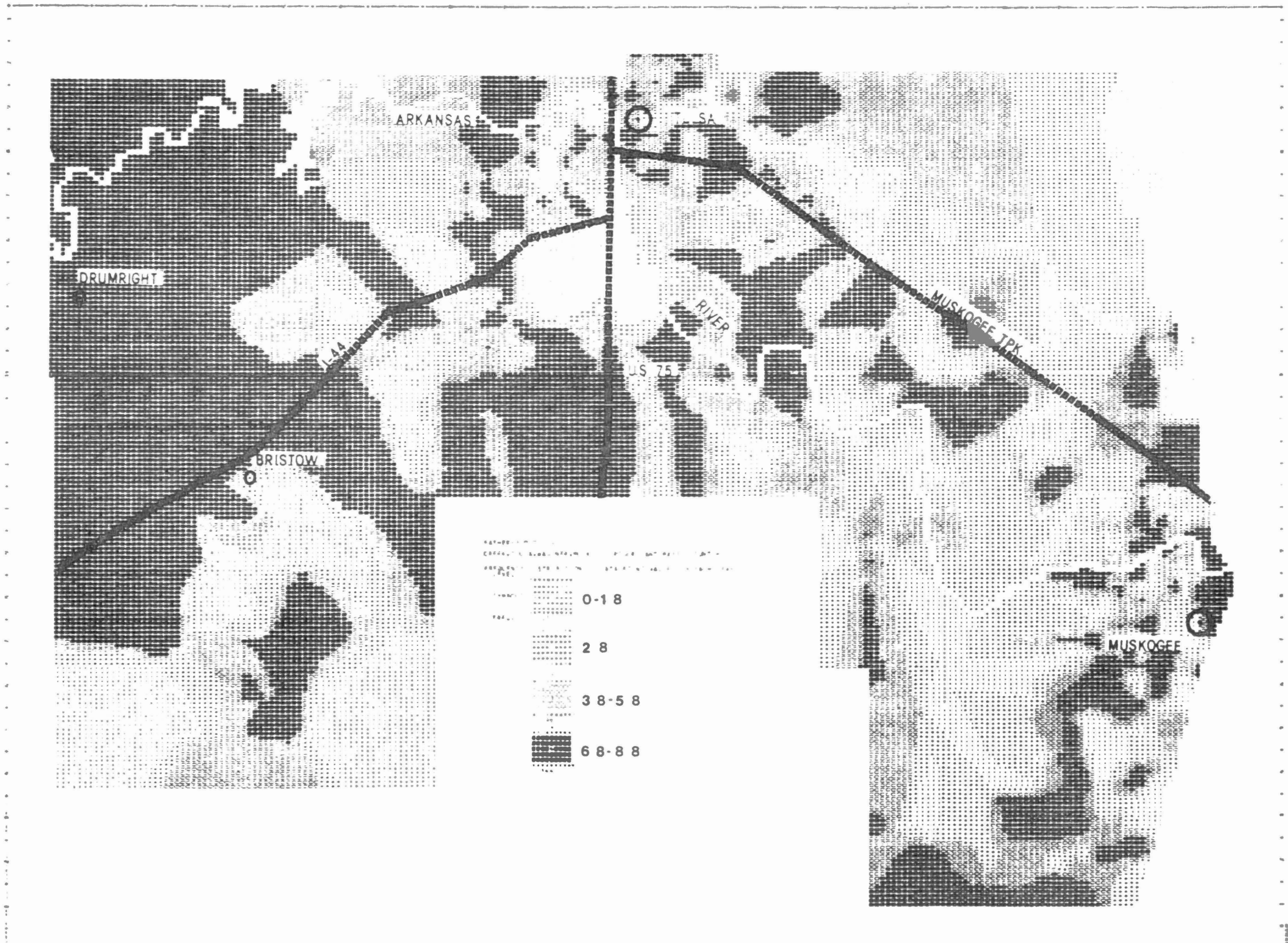


Figure 20. Father Blood Level--Northern Region

ancestry or blood level distribution characteristics. Blood level ranges from none (whites intermarrying with Indians) to full bloods (8/8). Educational ranges include elementary grades to college.

Geographically, these figures represent the north-central Oklahoma counties of Creek, Tulsa, Wagoner, Muskogee, Okmulgee, Okfuskee, McIntosh and Hughes; and parts of Rogers, Mayes, and Seminole (see Figure 1). As indicated previously (Chapter III), the northern area of the Creek Nation tends to be the most populated and urbanized with the southern area being characterized primarily by small communities and rural populations.

Each parent classification is analyzed regarding Indian blood level and educational characteristics. The principal purpose of this analysis is to demonstrate the feasibility and ease with which one may determine both the location and characteristics of a potential client population in delivering educational programs.

To this end, the greatest range in variation is described in relation to overall consistency of pattern. Additional attention is given to both intermediate ranges of variability in relation to examples depicting inconsistencies and potential abnormalities. By so doing, tribal educational program planners may anticipate and prepare for contingencies normally not considered such as: (1) isolated clusters of families needing remedial education found in areas of generally high affluence and education, and (2) a high degree of socio-economic segregation of Indian families, with children of minimally educated parents concentrated in certain areas of the reservation.

The greatest range of variation in distribution relative to Indian mothers appears to be between individuals at the lower end of the Indian blood level range. Creek mothers whose blood quantum is 1/8 to 2/8 appear to be concentrated primarily on the northern and western fringes of the Creek Nation. A major concentration is found from the intersection of I-40 and Turnpike West, in and around the communities of Henryetta, Okemah, Boley and Wetumka, Oklahoma. This variation also holds true for those parents claiming 3/8 to 5/8 Indian blood.

Although Creek fathers fit the general consistency of pattern, the distribution of those individuals claiming an Indian blood level of 1/8 to 2/8 tend to be distributed south of I-40 centered on the communities of Holdenville and Wetumka. Similar concentrations are observed west of Okmulgee (Creek Nation Capitol) and south of Checotah, Oklahoma.

The most consistently observed pattern of distribution relative to both Creek mothers and fathers is found in small areas of the southern region with individuals claiming an Indian blood level of 6/8 to 8/8. In both instances their distribution is widespread (see Figures 17 through 20). Densities of both parental categories appear to increase outwardly from small population centers.

The northern region's distribution characteristics of three-quarter to full-blood Creek parents tends to significantly differ from those in the south. Creek fathers whose Indian blood level tends to be high are found primarily in the northwest quadrant from Bristow to north of the Arkansas River. Secondary concentrations can be observed in the southeast, centered primarily on the city of Muskogee, Oklahoma (Figures 17 through 20). Although not as extensive, similar patterns are also observed for Creek mothers whose Indian blood level is from 6/8 (three-quarters) to 8/8 (full-blood).

The significance of these observable patterns lies primarily in their use in determining the focus of educational programming. If tribal planners are going to focus tribal resources and policy of those members closest to Indian culture (e.g., one-half to full-bloods), then large urban centers such as Tulsa should not be considered as principal service delivery points for either parental classification.[4] As indicated in Figures 17 through 20, two distinct distribution patterns emerge: (1) those parents with relatively low Indian blood levels (less than one-half) who tend to be concentrated in the northern, more urbanized region in and around Tulsa and Muskogee, Oklahoma; and (2) those parents with relatively high Indian blood levels (greater than one-half) who tend to be concentrated in the southern, primarily rural region in and around small communities such as Boley, Wetumka, and Okemah.

In Figure 17, the Indian blood level of Creek mothers within the southern region of the Creek Nation is examined and graphically illustrated. Distinctly visible is the large number of Creek mothers residing in this region with an Indian blood level of 6/8 to 8/8.

These women are widely concentrated throughout most of the rural areas, yet also reside in the population centers of Holdenville, Wetumka, Okemah, and Okmulgee. Creek mothers with an Indian blood level of 3/8 to 5/8 are much less prevalent, yet also resemble those with higher blood levels by their evidenced location in rural areas and close to towns.

Creek mothers of 0 to 1/8 and 2/8 Indian blood level have similar patterns in regards to their residence primarily in areas surrounding population centers. These two categories appear to reside more frequently in the western area of the southern region.

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[4] Warheit, Bell, and Schwamk, pp. 55-56.

Figure 18 illustrates the distribution of Creek mothers in the northern region by Indian blood levels. Within this region, Creek mothers with an Indian blood level of 6/8 to 8/8 are prevalent throughout, yet their concentrations near population centers is also evident. An interesting note should be made in describing the location of those women with an Indian blood level of 3/8 to 5/8. In Figure 18, this group appears to "buffer" or be located immediately next to the Creek mothers with an Indian blood level of 6/8 to 8/8. While no definitive reason may be given as a result of this study, a possible answer may be the desired closeness of groups of individuals who share a common heritage.

Those women with an Indian blood level of 2/8 are also located in rural areas and close to population centers. Creek mothers with 0 to 1/8 Indian blood levels are concentrated in pockets that are also primarily rural or near metropolitan areas.

Figure 19 is a SYMAP depicting the Indian blood level of Creek fathers surveyed living in the southern region of the Creek Nation. It is visibly clear that the majority of Creek fathers residing in this area had a claimed Indian blood level of 6/8 to 8/8.

These men resided primarily in rural areas and in small population centers, and clustered near the periphery of the larger urban communities in the region such as Holdenville, Okemah, and Okmulgee. As was true with Creek mothers in Figures 17 and 18, Creek fathers with an Indian blood level of 3/8 to 5/8 appear to reside in "bands" or buffers contiguous to those with an Indian blood level of 5/8 to 8/8.

Creek fathers with an Indian blood level of 2/8 reside in small concentrations on the periphery of small urban communities. Men with

0 to 1/8 Indian blood levels appear in larger concentrations than those with 2/8 Indian blood levels. They are also located in or near small communities and radiate from those communities into portions of the rural southern region.

The Indian blood level of Creek fathers is illustrated in Figure 20, a SYMAP of the northern region of the Creek Nation. Within this region, those with an Indian blood level of 6/8 to 8/8 are highly concentrated in the western area. This is primarily a rural area with several small communities. These individuals reside in or near to the larger urban areas of Tulsa and Muskogee in the eastern section.

Creek fathers with an Indian blood level of 3/8 to 5/8 are found to reside contiguous to the larger concentrations of Creek fathers with an Indian blood level of 6/8 to 8/8. The smaller concentrations of fathers with Indian blood levels of 0 to 1/8 and 2/8 are located in rural areas and close to small urban areas.

Parental Educational Level

By far the most extensive and heaviest concentration of Creek parents achieving at least some post-secondary education are found in the northern region of the Creek Nation. This particular pattern is consistent for both mothers and fathers. The greatest range in variation (extensiveness of distribution) is found in the southern region for Creek parents achieving less than a high school education but greater than 10 years (Figures 21 and 23).

For those individuals achieving less than a high school education, their major location characteristic seems to be rural, away from major population centers and area arterials. This suggests that in the more

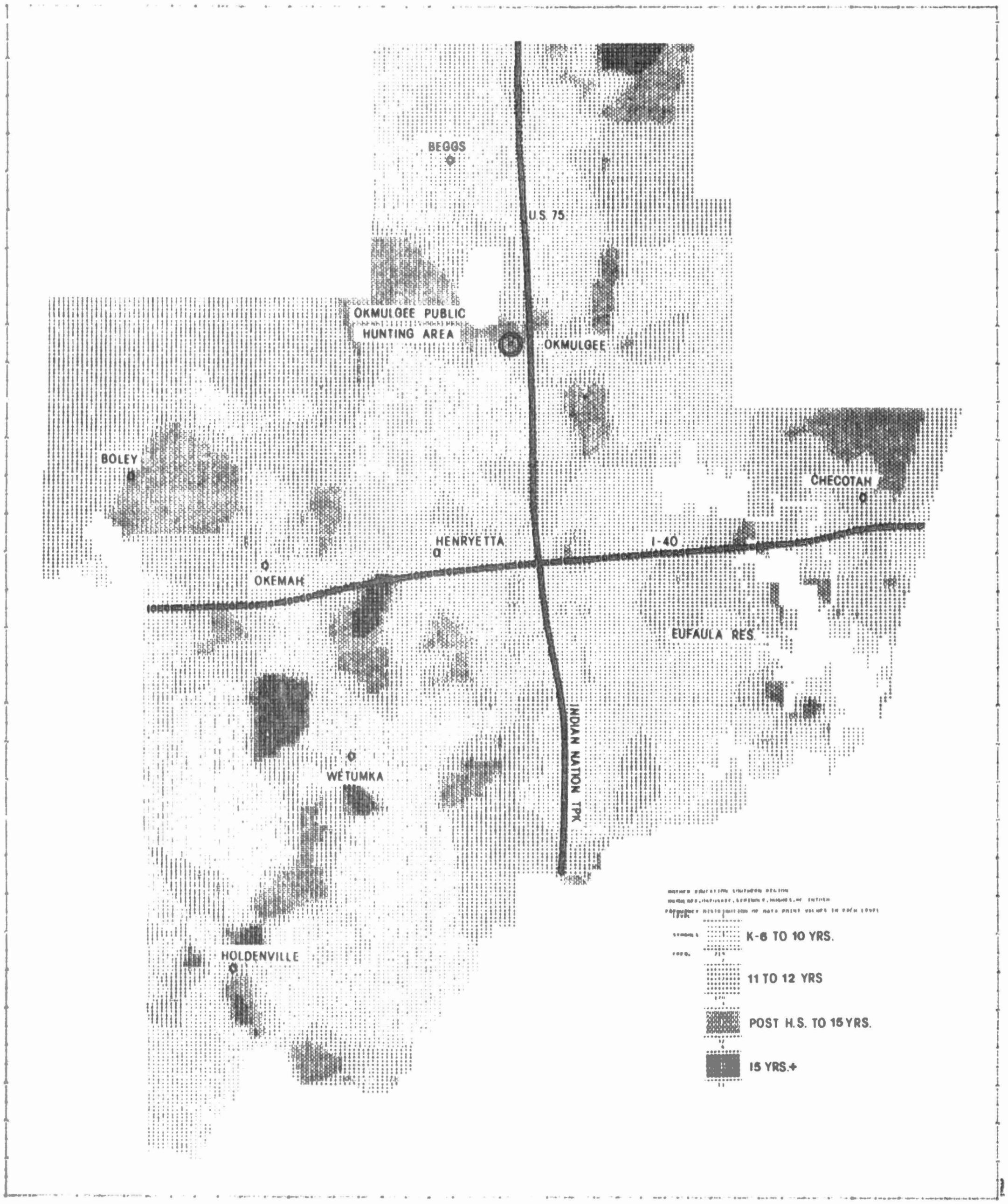

Figure 21. Mother Educational Level--Southern Region

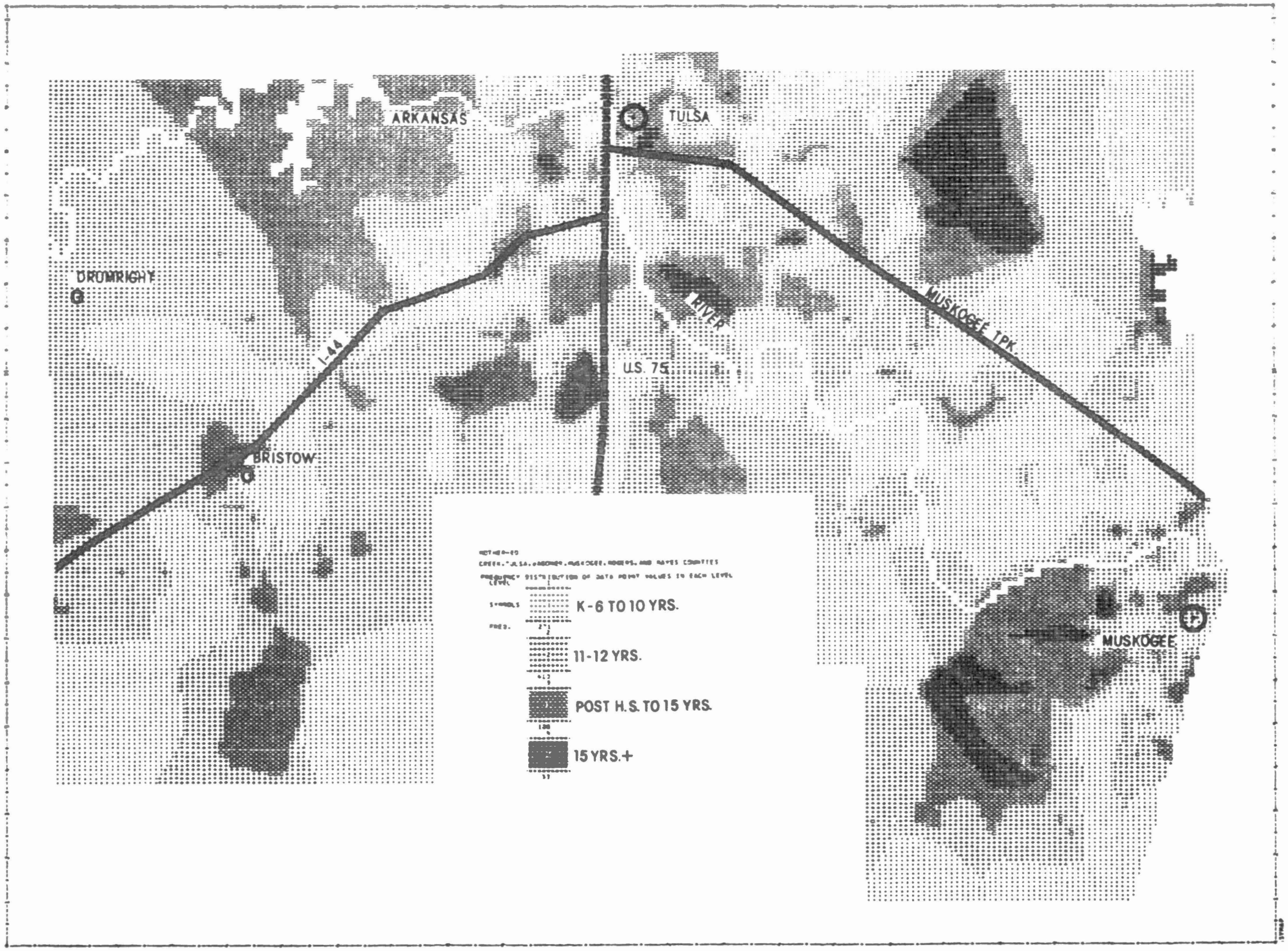

Figure 22. Mother Educational Level—Northern Region

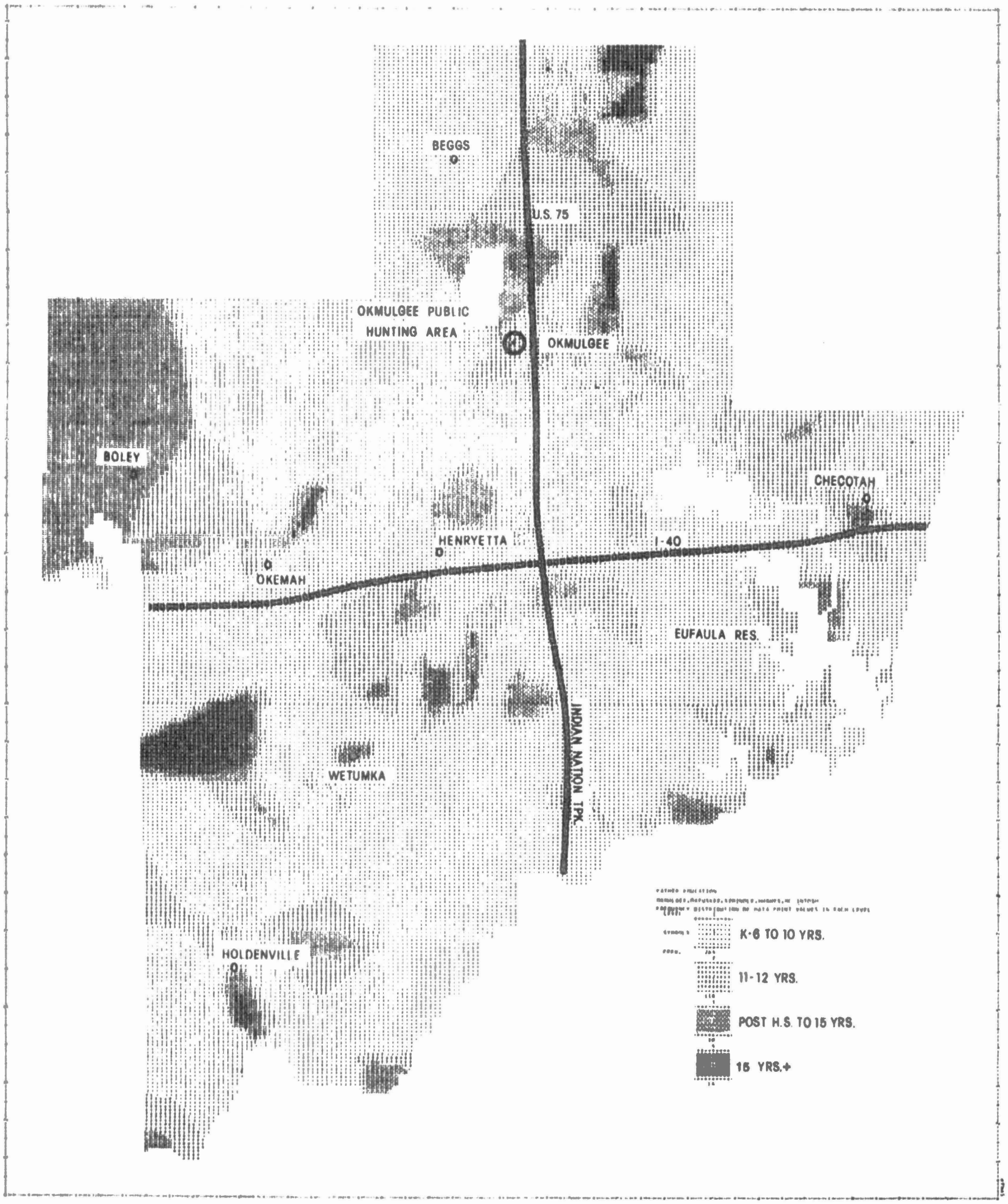

Figure 23. Father Educational Level--Southern Region

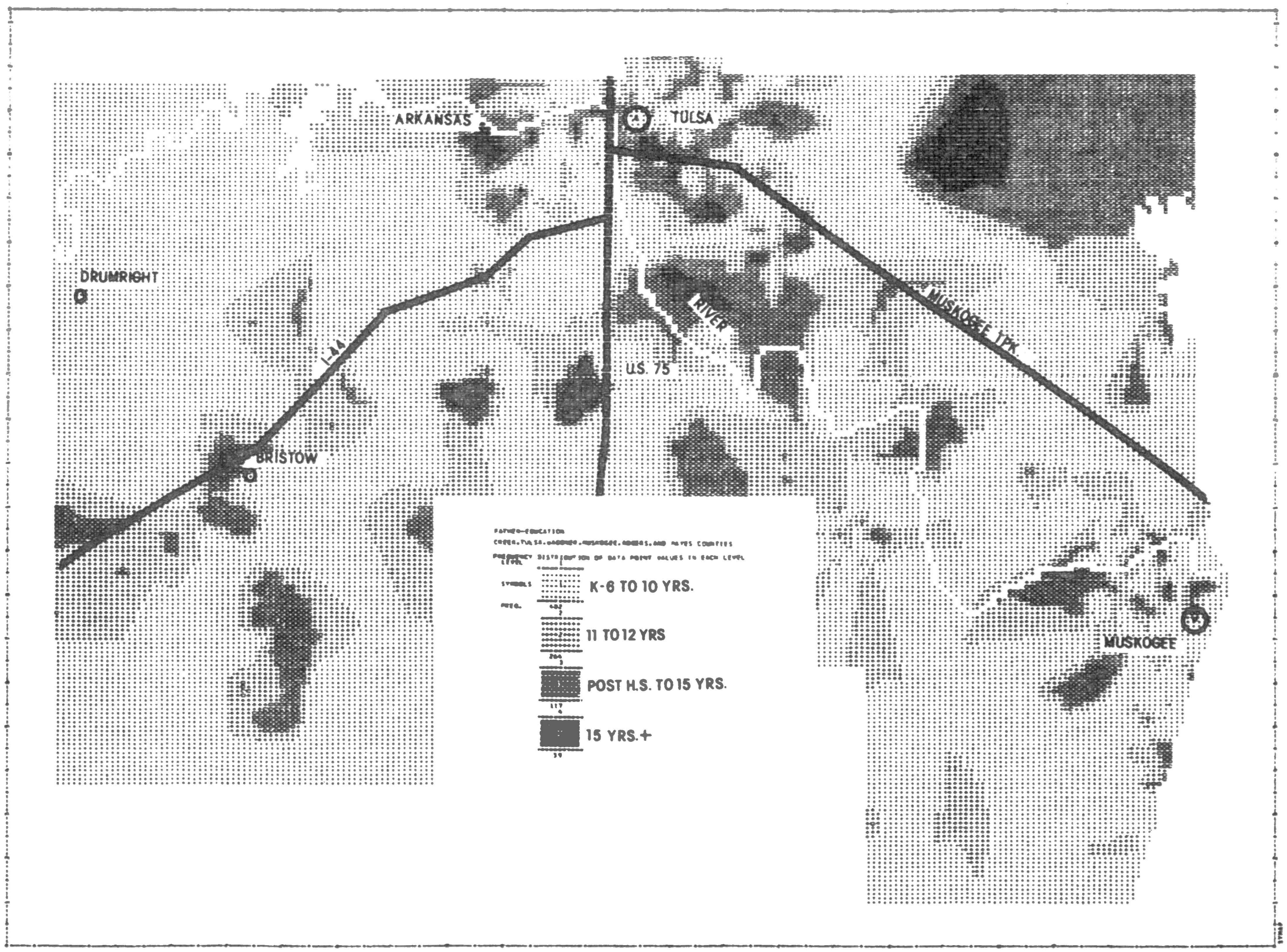

Figure 24. Father Educational Level--Northern Region

isolated areas of the region are concentrated the most significant clusters of less educated parents.

Conversely, major clusters of Creek parents who have achieved from one to three years or more of post-secondary education tend to be located near major population centers in both the northern and southern regions of the Creek Nation (Figures 21 through 24). An exception to this pattern is found in the southern region south and west of Okemah. Here a major concentration of both mothers and fathers are found who have achieved in excess of three years of post-secondary education; but who are not located near a major urban center nor a small rural community. Perhaps this concentration of relatively well educated Creek parents is due in part to its proximity and accessibility to East Central State University (Ada, Oklahoma) and Seminole Junior College. This relationship suggests that as one moves closer to urban centers, the greater the concentration of more well educated Creek parents.

Figure 21 illustrates the educational level of Creek mothers in the southern region of the Creek Nation. In examining this map, the large number of women with an education of 10 or less school years is clearly visible. These mothers are scattered widely throughout the rural areas of this region.

Those Creek mothers with an educational level of 11 to 12 years are also scattered; however, they are not as prevalent as the aforementioned. Those Creek mothers with an education of 13 to 15 years are located in less than 10 pockets of women within this category, and they reside closer to population centers, particularly those communities of Tulsa, Wetumka, Holdenville, Okemah, and Henryetta.

Further insight into this map may be gained by referencing Figure 7. This graph depicts the percentage breakdown of educational levels of all Creek mothers. Those mothers achieving a post-secondary education comprise 15.6 percent of the surveyed population for both the southern and northern regions.

Figure 22 depicts the educational level of Creek mothers residing in the northern region of the Creek Nation. The northern region includes a larger representation of those with an educational level above 10 years.

Creek mothers with 10 years or less of education living in this region, as in the southern region, are scattered predominantly through the rural sections of the northern region. Those women with 11 to 12 years of education are also dispersed in the rural areas, but also are visible in the population centers.

Those attaining a post high school education to 15 years are highly concentrated in or near population centers. Creek mothers with 15 years or more of education are highly concentrated in small pockets located very close to metropolitan areas.

Figure 5 is a graphic comparison of the total number of Creek mothers and fathers surveyed who have completed up to a high school education with those who have completed one year of post-secondary education. This better clarifies the visual disparity apparent in Figures 21 and 22, in which few concentrations of those mothers receiving a post-secondary education are visible. Figure 5 indicates that only 15.7 percent of all Creek mothers attained this level of education, whereas 84.3 percent received a high school education or less.

Figure 23 maps the educational level of Creek fathers in the southern region of the Creek Nation. As was seen also in Figure 21, fathers with an educational level of kindergarten through 10 years comprise the largest category in this region. These men are widely apportioned through this primarily rural area.

The other educational level categories are highly concentrated in close proximity to population centers. While those achieving 11 to 12 years of education are less prevalent than those with less education, they are scattered throughout the region. This is not true of those achieving more than a high school education. These individuals are quite distinctly located in the metropolitan areas of Tulsa, Wetumka, Holdenville, and Okmulgee.

While Figure 7 depicts Creek fathers throughout the Creek Nation, it graphically illustrates percentage breakdown of these individuals by educational level. The majority, or 79.0 percent, have 12 years or less education. Consequently, the remaining 21.0 percent are those men with post-secondary educations located in both the southern and northern regions of the Creek Nation.

Creek fathers residing in the northern region are illustrated in Figure 24 according to their educational level. This analysis is similar to that found in Figure 22 regarding Creek mothers.

Creek fathers with an educational level of 10 years or less are widely apportioned throughout the rural areas of the northern region. Men with 11 to 12 years of education appear to also be located in rural areas; however, they are also located closer to population centers.

Individuals with post high school educations are concentrated primarily in population centers. This is true of those with 15 years or more of education also. They reside in small pockets in close proximity, or within large population centers.

Summary

The Chi-square analysis showed a marked discrepancy for both full blood Creek mothers and fathers in their educational attainment at the high school and college level. This is despite the fact that the histogram, notably Figure 6, showed a relatively high percentage of mothers and fathers with at least a high school education. In closer inspection of the low educational attainment of full blood Creek parents, through computer mapping, one can isolate those geographic regions wherein the full bloods with low educational attainment reside. The geographic origin of these individuals appears to be rural areas of the southern region. The implications of combining SPSS and SYMAP results in creating a methodology whereby tribal planners can pinpoint, quantitatively and geographically, areas of greatest educational need.

By identifying educational problems using frequency distribution, Chi-square, and computer maps the feasibility of combined SPSS and SYMAP in developing an efficient and accurate educational planning and information system has been demonstrated. By the combined application of both a statistical and cartographical methodology, visual phrases are created which simply convey rather complicated research information concerning tribal educational characteristics.

CHAPTER V

SUMMARY, CONCLUSIONS AND RECOMMENDATIONS FOR FUTURE RESEARCH

Summary

The principal purpose of this dissertation was to determine the feasibility of using two computer based research programs, SYMAP and SPSS, in formulating an efficient and accurate Creek Nation tribal educational planning and information system. The feasibility of using these programs in tribal planning centered around two variables selected as test components in developing computer based educational planning and information systems: (1) the educational level (expressed in number of school years completed for Creek parents) and (2) the degree of racial linkage of parents expressed by Indian ancestry or blood level of the biological family.

The purpose of developing a computer based mapping component of TEPIS was to provide a visual comparison of density levels of parental Indian ancestry and education, whereas SPSS would develop an analysis of potential statistical differences or relationships between these two variables. Thus, TEPIS would be a means of presenting planning data in two complementary forms: (1) a numerically aggregated display, and (2) individual data items through geographic mapping of values for each sample household. Additional requirements underlying the basic purposes of TEPIS included the development of both statistical and visual data which would recognize degrees of educational disadvantage among tribal members. Selection of parental Indian blood level and education as test variables reflected an immediate concern of tribal leaders for those tribal members they considered closest to Creek culture.

Basic methodologies included formulation of the survey instrument (Appendix A), considerations in sampling technique, conducting the survey, coding results, and organizing data into a format compatible with SPSS and SYMAP. The survey instrument consisted of 36 variables and used individual Creek households as the basic unit of analysis.

The survey was conducted within the Creek Nation of Oklahoma (Figure 1). This area consists of all or parts of some 11 counties of north central Oklahoma including: Okfuskee, Okmulgee, Creek, Wagoner, Muskogee, McIntosh, Tulsa, Rogers, Mayes, Seminole and Hughes.

The 1,225 sample households were both randomly and systematically selected for inclusion in the sample population. The survey was systematic in that each township within the Creek Nation is represented; the survey was random in that the selection of households within each township was accomplished by generating from a table of random numbers a number from 1 to 36, each of which corresponded to 36 square mile sections contained in a typical township (Appendix B).

The survey instrument was organized to facilitate automatic data processing using the IBM Model 29 or 129 keypunch machine and IBM Model 370-135 computer, the reason being the general availability of this equipment to tribal governments through the State University Extension system. In designing the questionnaire, careful attention was given to not including open-ended questions which would have precluded fast and efficient coding of responses for analyzing using SPSS.

Data were keypunched directly from questionnaires to IBM 80 X 80 cards. After keypunching, verification of data cards was accomplished by both the author and the staff of the Oklahoma State University Computer Center.

In order to meet visual informational needs regarding parental Indian blood level and educational levels, eight computer maps of these characteristics were produced. Maps pertaining to each variable were produced for two regions (North and South) of the Creek Nation. The study area was divided into two regions because of program limitations of a maximum of 1,000 data points (TEPIS contains 1,225 data points). Each household, as part of the sampling process, was assigned an X and Y coordinate, identifying that location as unique, separate and apart from all others within the sample. Other coordinate systems were then developed for the study area, and actual household values to be mapped were established. In this study, output contour maps were 20 by 30 inches and then reduced to page size.

Data were then analyzed using SPSS crosstabulation and the Chi-square statistic in order to determine whether an expected pattern of relationship could actually be discerned from the sample population. The null hypothesis--"There is no significant difference between parental Indian ancestry or blood level and education"--reflected the need to statistically reinforce visual display of data through quantitative analysis.

By thorough computer-based statistical and visual analysis of Creek Indian mothers' and fathers' educational levels, it was demonstrated that utilization of a TEPIS model approach should increase the capacity of the tribal planner to carry out both visual and quantitative analysis. It has been demonstrated that the combination of Statistical Package for the Social Sciences and Synagraphic computer mapping program does broaden the tribal educational planner's potential in two directions: (1) he can make more intensive use of complicated statistical and mapping techniques which cannot easily or quickly be carried out without machine processing; and (2) the use of data processing equipment with already programmed analysis packages allows the tribal planner to manipulate much larger quantities of data than could be handled by more traditional hand methods, without costly investments in staff time.

Parental Indian ancestry or blood level and education are closely related, both geographically and statistically. Statistically the association appears to be most significant in relation to the total sample population (Figure 2). Geographically, Creek full blood parents (8/8), although better educated than whites intermarrying into Indian families, tend to be located in rural areas or regions of low population (Figures 17 through 20).

The better educated Creek parents appeared to be those exhibiting an Indian blood level of from 1/4 to 1/2. These individuals were found to be distributed primarily in and around major population centers of Tulsa, Muskogee, and Okmulgee, Oklahoma (Figures 17 through 24). These individuals also appear to be positioned on the periphery of major concentrations of Creek parents whose Indian blood level is from 1/8 to 2/8 (Figures 17 through 24).

A possible reason for heavier concentrations of educationally disadvantaged Creek parents in rural areas may be due to the reduced capability of rural areas to provide a broad range of educational opportunities. Conversely, urban centers within the Creek Nation such as Tulsa and Muskogee provide various service amenities of cities and towns coupled with increased job and educational opportunities.

Other factors may include social reasons. For example those individual Creek parents who may be close to Indian culture by virtue of high blood levels (1/2 to 8/8) may prefer to live in proximity to those with similar heritage. This factor would certainly be an important planning consideration if educational programs promoting Indian culture were to be offered to tribal members. As indicated by Figures 17 through 24, questions pertaining to tribal, ethnic and educational characteristics, the size of the group to be served, and the potential volume of demand may be answered by TEPIS statistical and visual output.

This distribution is assumed to be present in the total Creek tribal population. As such, Creek tribal educational policy should reflect an emphasis on outreach educational programming designed to bring education to the Indian student, not the student to education. Because rural areas in both southern and northern regions of the Creek Nation are characterized by small population centers and low population densities, accessibility to tribal educational service delivery points must be a major consideration. Thus, the visual aspect of TEPIS takes the important step in tribal educational planning of geographically identifying and characterizing the basic educational and ethnic patterns of Creek peoples, and more specifically, effectively probes for the tribal planner the demographic implications of these distribution patterns.

Conclusions

By utilization of TEPIS, tribal planning staffs can more effectively cope with performing such functions as: coordination of educational projects to insure that they are developed, implemented, and brought to completion; statistically and visually monitoring of educational programs and comparing what is happening with what was supposed to happen; analysis and evaluation of the impact of educational projects to determine what happened, to who and how well it happened; on-going planning of educational programs; administration of the foregoing to insure that coordination, monitoring, evaluation, on-going planning and administration itself effectively take place through the tribal staff. All of the actions resulting from these educational planning functions (expand, re-direct, know, recognize, decide, etc.) can be facilitated by reliable information produced by a statistical and visual tribal information system.

TEPIS provides the basic ingredients that would assist these functions to take place over time: a set of examples that, through their application to other socio-economic variables should assist tribal staffs in identifying the educational and demographic information it needs to establish geographical areas of priority. With computer facilities available through each state's university extension system, TEPIS will assist tribal staffs in collecting, storing, processing and reporting this information on an on-going, established routine basis.

TEPIS provides accurate statistical and cartographical information upon which can be based sound decisions and should increase the potential for sound tribal management decisions because:

(1) It could be based on data pools already existing in the public domain such as census reports, governmental agency statistics and so forth; or on survey generated demographic information collected by tribal staff;

(2) It could provide visual information on tribal target populations socio-economic characteristics in the form of simple, easy to understand maps;

(3) It could provide data for comparative analysis of needs and tribal service utilization for Indian people;

(4) It could visually and statistically monitor changes in the general socio-demographic, economic and sociological changes within the tribal jurisdiction;

(5) It can provide both statistical and cartographical data for program development and documentation for external funding;

(6) It presents information in a useful form.

One may conclude that Creek Nation tribal educational problems have a distinctive geographical component, and that the incidence of Indian educational achievement can be subject to extreme geographical and social variation. Also apparent is the need of tribal planners to correct areal or regional educational discrimination or inequality by focusing on areas evidencing the greatest educational need.

The lack of adequate information and planning methodologies on statistical and geographical variations on Indian education within tribal jurisdictions has been pointed out. Tribal administrators have been able to give little attention to geographical variations in educational achievement, as a result of a lack of reliable and understandable information. With application of TEPIS these conditions could change.

Tribal planners in analyzing TEPIS cartographical and statistical output could become more aware, hopefully communicating this awareness to elected tribal officials.

The position taken here is that computer based statistical and cartographical methodologies can be combined to facilitate analysis of tribal demographic and educational characteristics, thus enhancing better decisions regarding educational program delivery and accessibility. TEPIS informational output could also assist tribal officials to convey critical educational data to their client population, thus helping to sensitize Indian people to the magnitude of quantitative inequities in education within Indian society.

TEPIS can recognize those individuals who are the most educationally disadvantaged but at the same time closest to Indian culture. In this way an information system has been developed which provides usable and effective educational planning information in developing better tribal services to the educationally disadvantaged within the tribe.

TEPIS is an accurate education planning tool that is easily understood and implemented by tribal staff members. It is a versatile system, capable of serving both the needs of the tribal planner and the program evaluator. By analysis of parental ethnic characteristics and education, TEPIS proves it can produce data that are cartographically and statistically valid. Hence, it is able to meet the needs of tribal staff charged with the development of an effective, least cost restrictive, user accepted tribal education system.

Recommendations for Future Research

The Bureau of Indian Affairs (United States Department of the

Interior) should make a concerted effort to link tribes with available computer resources and planning expertise. Currently, the majority of tribes lack both the expertise and computer resources to establish a comprehensive tribal educational planning and information system. A feasible solution to this problem would be the establishment of a computer consortium composed of local, state and federal agencies willing to share facilities and professional expertise with tribes.

Recommendation (1)--A committee composed of representatives of the Bureau of Indian Affairs, State universities and local government should be formed to study and formulate recommendations regarding the feasibility of establishing a computer consortium to aid tribes in information gathering and processing for educational planning purposes.

Recommendation (2)--A comprehensive identification and reporting of data sources available to tribal administrations, their structure, accessibility and probable collection costs should be completed and published by this committee.

Recommendation (3)--Future tribal information system developments should be aware of the importance of first identifying geographical units of sampling, analysis and mapping. Tribal needs assessments in metropolitan regions, for example, may want to utilize existing area units such as census tracts or enumeration districts and block groupings. In larger units, however, resorting to townships and sections may be the only feasible alternative.

Tribal planners should be aware that whatever choice is made for the geographical unit of analysis, it carries with it extremely important consequences. For example, if the choice is made to analyze and map by census tracts, their very size tends to obscure the relevance of certain types of data since the tracts are sometimes large and heterogeneous. On the other hand, future researchers should also be aware that if smaller units are chosen for analysis, such as block groupings, they will tend to find that data become very thin and the number of data points unwieldly.[1]

Recommendation (4)--Tribal educational planning and information systems should be based on probability surveys. It is true that surveys, particularly large ones, designed to measure tribal social and demographic systems are difficult to design and conduct. However, not all surveys need to be large and complex. Neither do they need to be prohibitively expensive, even for tribal agencies with limited staff and resources. This is especially true when carefully formulated and tested survey instruments are used (one such instrument is presented in Appendix A).

Recommendation (5)--Future researchers in attempting to develop tribal educational information systems should, in part, focus on data collection and analysis which could measure the importance of education to Indian social well-being, improvement of earning capacity, bestowal of status and social mobility.

Recommendation (6)--Because many tribes are small (the Apache tribe of Oklahoma, for example, has less than 850 known members), tribal educational planning information systems should strive to make available an option which could collect, analyze, and map data on a household-by-household basis rather than in aggregate form. For example, an educational Indian ancestry or blood level index could be calculated for each

[1]Warheit, Bell, and Schwamk, p. 51.

household and then mapped. This descriptive statistic would quantitatively and visually summarize tribal members who are close to Indian culture by virtue of ancestry, with number of school years completed.

Recommendation (7)--Tribal planners might design a comprehensive, horizon scanning data collection system compatible with TEPIS in order to provide tribal policy makers with potential problem early warning and identification. In so doing, future research in this area would allow tribal officials (Chief, tribal council, etc.) a good understanding of how and where to respond in certain geographical areas, and insights concerning which socio-economic situations may become major concerns. For example, these concerns may include the effects of changing policy regarding educational program eligibility by lowering Indian blood level requirements, coupled with potentially changing distributions of tribal members. Changing distribution patterns of eligible tribal members would create some difficulty in determining where to focus a particular education or social service program. Other factors may include population increase and the resultant change in demand on educational resources.

Thus, tribal educational planners could explore these policy concerns by developing a profile of current and projected conditions, based on statistical and cartographical analysis of data now available, in light of explicit assumptions about the future. For example, data now available concerning parental Indian blood level and education could be used to determine the extent and location of Creek tribal members of one-quarter blood or higher who would be eligible for basic grants for vocational technical education programs for persons not completing high school. By utilizing TEPIS, exact locations of persons meeting the aforementioned criteria could be located and contacted regarding their eligibility for such a program. This approach would enhance the efficient use of available educational resources in relation to minority groups, age groups, and particular geographical areas.

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APPENDIXES

APPENDIX A

CREEK NATION CENSUS SURVEY INSTRUMENT

WITH CODING LISTS

CREEK NATION CENSUS SURVEY

County ______________

Township ____________

Range _______________

Section _____________

Variable 1. HOUSEHOLD INCOME PATTERN: (Circle)

01. $ 500 - $ 1,000
02. 1,000 - 2,000
03. 2,001 - 3,000
04. 3,001 - 6,000
05. 6,001 - 10,000
06. 10,001 - 15,000
07. Over 15,000

Variable 2. RESIDENCE STATUS: (Circle)

01. Urban (Greater than 2,500)
02. Rural

Variable 3. HOUSING STATUS: (Circle)

01. Own fully (Just one owner)
02. Own partially (More than one owner)
03. Rent
04. Other (please explain) ____________________________

Variable 4. If house is owned, how is it financed? (Circle)

01. Financed by Creek Nation Housing Authority
02. Financed by Home Improvement Program (HIP)
03. Financed by Farmers Home Administration (FHA)
04. Financed by Other Federal Assistance
05. Financed by Private Funding
06. None of the above

Variable 5. If renting, who is your landlord? (Circle)

01. Private individual or corporation
02. Creek Nation Housing Authority
03. Other Federal programs
04. None of the above

Variable 6. Is this house on restricted land? (Circle)

01. Yes
02. No

Variable 7. The present dwelling contains how many rooms? (Circle)

01. One
02. Two
03. Three
04. Four
05. Five
06. Six
07. More than six

Variable 8. What type of heating fuel is used at the present address? (Circle)

01. Natural gas
02. Electric
03. Wood/Coal
04. LPG (Propane)
05. Other

Variable 9. Where is the bathroom located? (Circle)

01. Inside
02. Outside

Variable 10. What is the water source for the present address? (Circle)

01. Well
02. Rural water line
03. City water
04. Pond

Variable 11. If well water is used, is it pumped into the house? (Circle)

01. Yes
02. No
03. Does not apply

Variable 12. How long has this family lived at this address? (Circle)

01. 1-12 months
02. 1-2 years
03. 2-4 years
04. 4-10 years
05. Over 10 years

Variable 13. Are there people currently living at this address who are not regular household members? (Circle)

01. Yes
02. No

Variable 14. If there are people currently living at this address who are not regular household members, how many? (Circle)

01. One
02. Two
03. Three
04. Four
05. Five or more
06. Does not apply

Variable 15. Is the tribal language used in the immediate family? (Circle)

01. Always
02. Frequently
03. Occasionally
04. Seldom
05. Never

Variable 16. How many household members are registered voters? (Circle)

01. None
02. One
03. Two
04. Three
05. Four
06. Five
07. More than five

Variable 17. How often does this household use Indian Health Services? (Circle)

01. Always
02. Frequently
03. Occasionally
04. Seldom
05. Never

Variable 18. This household was used Indian Health Services within the last: (Circle)

01. One year
02. Two years
03. Five years
04. Ten years
05. Does not apply

Variable 19. How often does this household use Bureau of Indian Affairs' services? (Circle)

01. Always
02. Frequently
03. Occasionally
04. Seldom
05. Never

Variable 20. This household has used Bureau of Indian Affairs' Services within the last: (Circle)

01. One year
02. Three years
03. Five years
04. Ten years
05. Does not apply

Variable 21. When at home, what one organization do you turn to most in time of emergency? (Circle)

01. Bureau of Indian Affairs
02. Creek Tribe (CHR, Manpower Representative, Education, etc.)
03. Non-Bureau of Indian Affairs' federal organization
04. Other

Variable 22. When away from home, what organization do you turn to in the time of emergency? (Circle)

01. Bureau of Indian Affairs
02. Creek Tribe (CHR, Manpower Representative, Education, etc.)
03. Non-Bureau of Indian Affairs' federal organization
04. Other

Variable 23. When at home, what one person do you turn to most in time of emergency? (Circle)

01. Relative
02. Minister
03. Tribal elder
04. Friend
05. Other

Variable 24. When at home and if you turn to a friend, is he or she: (Circle)

01. Indian
02. Non-Indian
03. Does not apply

Variable 25. When away from home what one person do you turn to most in time of emergency? (Circle)

01. Relative
02. Minister
03. Tribal elder
04. Friend
05. Other

Variable 26. When away from home and if you turn to a friend, is he or she: (Circle)

01. Indian
02. Non-Indian
03. Does not apply

HOUSEHOLD MEMBERS' (REGULARLY LIVING HERE) PERSONAL CHARACTERISTICS AND EMPLOYMENT PATTERNS

Member (See Coding List A)	Ages*	Education No. of Years Completed (Coding List B)	Highest Degree Completed (See Coding List C)	**	*** (See Coding List D)		Tribe (See Coding List E)		Degree of Indian Blood (Coding List F)		
							Major A	Major B	Major A	Minor B	Total C
____	____	____	____	____	____	____	____	____	____	____	____
____	____	____	____	____	____	____	____	____	____	____	____
____	____	____	____	____	____	____	____	____	____	____	____
____	____	____	____	____	____	____	____	____	____	____	____
____	____	____	____	____	____	____	____	____	____	____	____
____	____	____	____	____	____	____	____	____	____	____	____
____	____	____	____	____	____	____	____	____	____	____	____
____	____	____	____	____	____	____	____	____	____	____	____

*01 0- 5 years
02 6-12 years
03 13-18 years
04 19-25 years
05 26-35 years
06 36-50 years
07 51-65 years
08 Over 65 years

**If age of member is 6-18 years, then:
01. Still in school
02. Dropped out
03. Does not apply

***If member has more than high school education, where? (See Coding List D)

Understand Tribal Language (1=yes, 2=no)	Speak Tribal Language Fluently (1=yes, 2=no)	Tribal Town Affiliation (Coding List G)	Household Income Contribution (1=yes, 2=no)	Employment A****	Employment B*****
____	____	____	____	____	____
____	____	____	____	____	____
____	____	____	____	____	____
____	____	____	____	____	____
____	____	____	____	____	____
____	____	____	____	____	____
____	____	____	____	____	____
____	____	____	____	____	____

****01 Self-employed
02 Outside (work for someone else)
03 Unemployed
04 Retired
05 Does not apply

*****01 Part time (less than 40 hrs per week)
02 Full time
03 Does not apply

Occupation Skill (Coding List H)	Length of Time on Present Job or School ******	Distance to and From Work or School *******	Physical Handicap (1=yes, 2=no)
____	____	____	____
____	____	____	____
____	____	____	____
____	____	____	____
____	____	____	____
____	____	____	____
____	____	____	____
____	____	____	____

******01 1- 6 months
02 7-12 months
03 1- 2 years
04 3- 5 years
05 6-10 years
06 Over 10 years
07 Does not apply for high school age or less person

*******01 1- 5 miles
02 6- 10 miles
03 11- 20 miles
04 21- 30 miles
05 31- 50 miles
06 51-100 miles
07 Over 100 miles
08 Does not apply for high school age or less person

Coding List A

Household Members by Title

01. Father (Husband)
02. Mother (Wife)
03. Son
04. Daughter
05. Son-in-Law
06. Daughter-in-Law
07. Stepfather
08. Stepmother
09. Uncle
10. Aunt
11. Grandmother
12. Grandfather
13. Nephew
14. Niece
15. Mother-in-Law
16. Father-in-Law
17. Other (please describe) ____________________

Coding List B

Years of Formal Education Completed

01. K-6 grade
02. 7-9 grade
03. 10 grade
04. 11 grade
05. 12 grade (high school graduate)
06. 13 (one year of post-high school work)
07. 14 (associate degree)
08. 15
09. 16
10. 18
11. Over 18
12. Does not apply

Coding List C

Level of Formal Post-Secondary Education by Degree

01. Certificate of Completion
02. Associate Degree
03. Bachelors Degree
04. Masters Degree
05. Doctorate
06. Post-Doctorate
07. Does not apply

Coding List D

Post-Secondary Educational Institutions

01. Altus Junior College
02. Bacone College
03. Bethany Nazarene College
04. Cameron College
05. Carl Albert Junior College
06. Central State University
07. Claremore Junior College
08. Conners State College
09. East Central State College
10. Eastern Oklahoma State College
11. El Reno Junior College
12. Langston University
13. Murray State College
14. Northeastern Oklahoma A&M
15. Northeastern State College
16. Northern Oklahoma College
17. Northwestern State College
18. Oklahoma Baptist University
19. Oklahoma Christian College
20. Oklahoma City University
21. Oklahoma College of Liberal Arts
22. Oklahoma Panhandle State College
23. Oklahoma State University
24. Oral Roberts University
25. Oscar Rose Junior College
26. Phillips University
27. Saint Gregory's College
28. Sayre Junior College
29. Seminole Junior College
30. Southeastern State College
31. South Oklahoma City Junior College
32. Southwestern College
33. Southwestern State College
34. Tulsa Junior College
35. University of Oklahoma
36. Tulsa University
37. Haskell Indian Junior College
38. Chilacco, BIA
39. Out-of-State (other than Haskell)

Vo-Tech Area Schools

40. Tulsa
41. Enid
42. Oklahoma City
43. Lawton
44. Bartlesville
45. Drumright
46. Muskogee
47. Ardmore
48. Wayne
49. El Reno
50. Shawnee
51. Fort Cobb
52. Duncan
53. Burns Flat
54. McAlester
55. Poteau
56. Chickasha
57. Hugo
58. OST
59. Proprietary
60. Other
61. Does not apply

Coding List E

Indian Tribes Resident to the
Creek Indian Nation

01. Creek
02. Seminole
03. Euchee
04. Chickasaw
05. Choctaw
06. Cherokee
07. Kickapoo
08. Pawnee
09. Ponca
10. Potawatomi
11. Sac and Fox
12. Osage
13. Shawnee
14. Kiowa
15. Commanche
16. Seneca
17. Delaware
18. Cayuga
19. Shoshoni
20. Quapaw
21. Sioux
22. Chippewa
23. Navajo
24. Winnebago
25. Hopi
26. Pueblo
27. Other ______________________________
28. None

Coding List F

Degree of Indian Blood Quantum

01. 0
02. 1/8
03. 2/8 or 1/4
04. 3/8
05. 4/8 or 1/2
06. 5/8
07. 6/8 or 3/4
08. 7/8
09. 8/8 or 4/4

Coding List G

Tribal Towns Within Creek Indian Nation

01. Coweta
02. Broken Arrow
03. Cheyaha
04. Locharpoka
05. Conchartey
06. Hitchita
07. Cussehta
08. Taskeko
09. Tulsa (Canadian)
10. Tulsa (Little River)
11. Noyarka
12. Akfaske
13. Arbekoche
14. Arbeka
15. Arbeka 2nd
16. Greenleaf
17. Oewohka
18. Fish Pond
19. Thlopthlocco
20. Tokebachee
21. Thewahley
22. Kialiga
23. Tokpafka
24. Talmochassee
25. Eufaula 1
26. Eufaula 2
27. Pakantalahassee
28. Hillabee
29. Chartarksofka
30. Kichopatake
31. Arthussee
32. Tallahossochee
33. Allabamma
34. Osochee
35. Oeokofke
36. Okcharye
37. Ocheyapofa
38. Talwathakko
39. Talartega
40. Hutschechapa
41. Quassartey--1
42. Quassartey--2
43. Yoochee
44. Big Spring
45. Don't know
46. None

Coding List H

Occupational Skill Listing

01. Industrial Production
(Foundry workers - machinists - printers - assemblers - welders)

02. Office Occupations
(Clerks - accountants - lawyers - administrators - secretary)

03. Service Occupations
(Building custodian - cooks and chefs - waitresses - barber - policeman - mail carriers)

04. Educational Occupations
(Teachers - librarians - teacher's aide - community worker)

05. Sales Occupations
(Automotive sales - insurance agents - service station attendants)

06. Construction Occupations
(Bricklayers - carpenters - electricians - painters - roofers - plumbers)

07. Occupations in Transportation Activities
(Air Traffic controllers - railroad brakeman - truck or taxi driver)

08. Scientific and Technical Occupations
(Foresters - engineers - chemists - draftsmen)

09. Mechanics and Repairmen
(Telephone serviceman - automobile repairman - TV and radio repairmen - diesel mechanic - air conditioning repairman)

10. Health Occupations
(Dentist - physician - nurse - speech pathologist - community worker)

11. Social Scientists
(Anthropologists - historians - sociologists)

12. Social Science Occupations
(School counselor - clergyman - social worker)

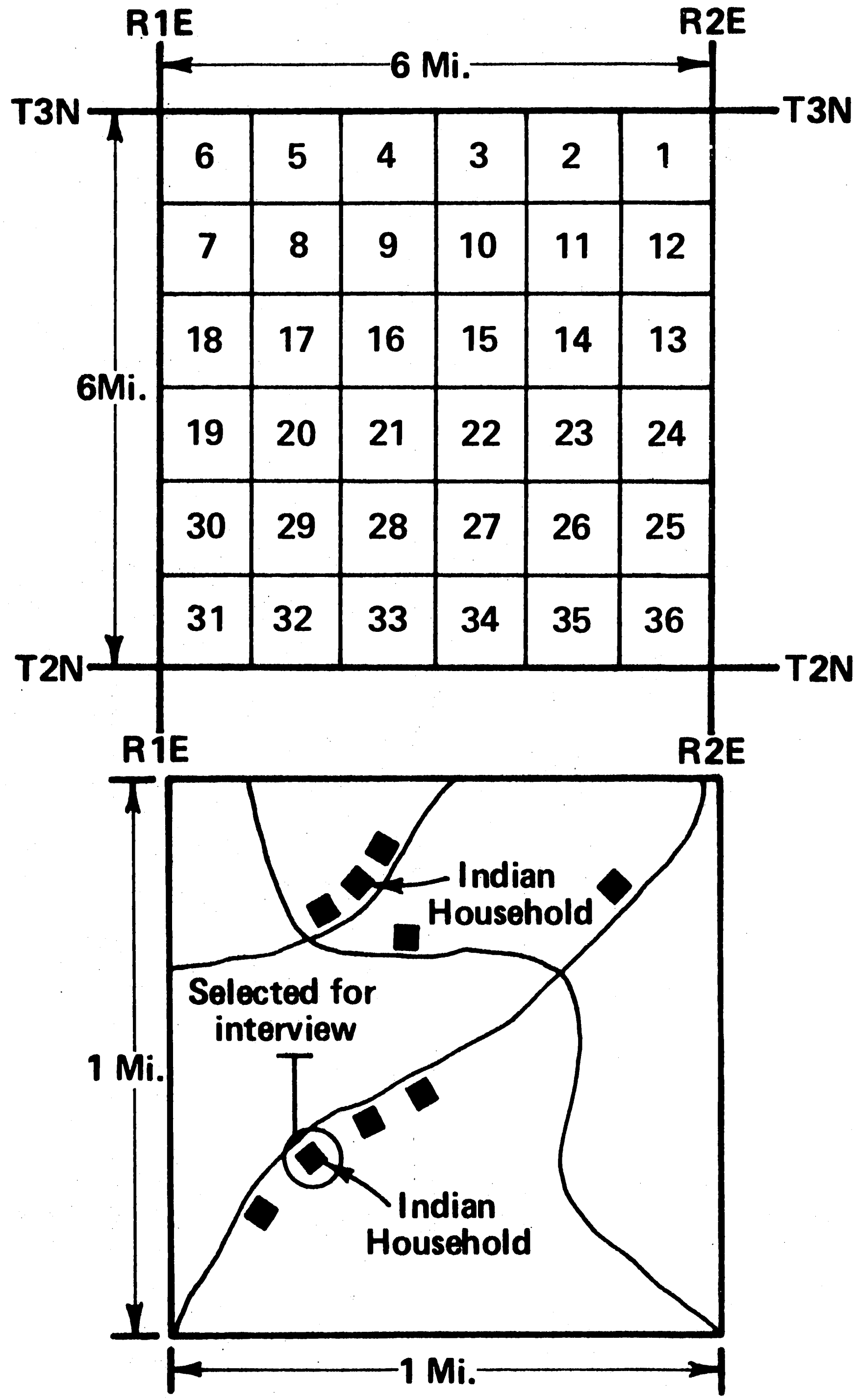
13. Occupations in Art and Design
(Artist - designer - architect)

14. Disabled

15. Does not apply

APPENDIX B

HYPOTHETICAL DISTRIBUTION OF CREEK HOUSEHOLDS WITHIN A TYPICAL TOWNSHIP



Source: Kenneth McKinley, James Martin, and Burl Self, <u>Creek Nation Census: A Socio-Economic Survey of Selected Household and Individual Characteristics</u> (Stillwater, 1976), p. 6.

Figure 25. Hypothetical Distribution of Creek Households Within a Typical Township

VITA 3

Burl Eugene Self, Jr.

Candidate for the Degree of

Doctor of Education

Thesis: A TRIBAL EDUCATION PLANNING AND INFORMATION SYSTEM

Major Field: Higher Education

Biographical:

Personal Data: Born in McAlester, Oklahoma, September 28, 1940, the son of Mr. and Mrs. Burl E. Self.

Education: Graduated from United States Army General Education Development Testing Program (High School) in December, 1959; received Associate of Arts degree in Social Science from Eastern State College in 1964; received Bachelor of Arts in Sociology from East Central Oklahoma State University in 1966; received Master of Arts in Geography from University of Oklahoma in 1971; received Master of Arts in Public Administration from University of Oklahoma in 1972; completed requirements for the Doctor of Education degree at Oklahoma State University in December, 1978.

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