AFRICA CHILD SURVIVAL INITIATIVE
COMBATTING CHILDHOOD COMMUNICABLE DISEASES
(ACSI-CCCD)

PILE SORT TECHNIQUES FOR PRIMARY HEALTH CARE PROGRAM DEVELOPMENT: ANALYSIS OF SISWATI TERMS FOR ACUTE RESPIRATORY INFECTIONS

UNITED STATES AGENCY FOR INTERNATIONAL DEVELOPMENT
Africa Regional Project (698-042.1)

U.S. DEPARTMENT OF HEALTH AND HUMAN SERVICES
Public Health Service
Centers for Disease Control,
and Prevention
International Health Program Office

This work was supported and made possible by the Africa Bureau, Office of Operation and New Initiatives (ONI) and the Office of Analysis, Research and Technical Support (ARTS), United States Agency for International Development (A.I.D.) through the Africa Child Survival Initiative - Combatting Childhood Communicable Diseases (ACSI-CCCD) Project, Africa Regional Project (698-0421) Washington, D.C.

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Pile Sort Techniques for Primary Health Care Program Development: Analysis of siSwati Terms for Acute Respiratory Infections

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Participating Agency Service Agreement (PASA) No. 0421 PHC 2233

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Abstract

This paper reports on the use of the pile sort technique to explore categories for 30 siSwati terms for acute respiratory infections.

We interviewed 29 mothers of children under the age of 5 who were randomly selected from 5 urban and 12 rural sites throughout Swaziland, as well as the 17 health providers and 13 traditional healers whom mothers reported they would contact if their child became ill.

Results of our study suggest that there are siSwati illness terms that correspond to many of the signs and symptoms of upper and lower acute respiratory infections. The respondents differentiated these terms into at least two distinct groups: one group included terms associated with the symptoms of common colds or flu that mothers manage at home, while the other group included terms that refer to more serious illnesses for which individual caretakers usually seek further professional treatment. However, the "cognitive boundary" between these two groups is not always clear. We expected differences in the folk and biomedical classification systems to be most clearly pronounced when comparing the pile sort results of community members (mothers and healers) with those of health providers because the mothers and healers are more likely to be familiar with the local ethnomedical system rather than the biomedical system familiar to the health providers. However, the differences were not as marked as we had expected.

Introduction

In 1990, the World Health Organization (WHO) reported that acute respiratory infections (ARIs) were responsible for 4.3 million childhood deaths, an estimated one-third of infant and child mortality in developing countries (WHO 1992). There are two basic categories of ARIs: acute upper respiratory infections (AURIs), which include pharyngitis, the common cold, and ear infections; and acute lower respiratory infections (ALRI) (WHO 1990a).

Bacterial pneumonia, an ALRI, is the principal cause of most ARI mortality (United Nations Children's Fund 1988; Galway, Wolff, and Sturgis 1987). During 1988, 15% of hospital deaths of children under the age of 5 in Swaziland were attributed to ARI. In the context of strengthening its commitment to improving child health, the Swaziland Ministry of Health (MOH) identified ARI as an important area for reduction of mortality and morbidity (Primary Health Care Project 1990).

Using the WHO guidelines, the MOH's ARI program strategy focused on reducing pneumonia mortality through early detection of ALRI by mothers and health providers and through appropriate case management at a health facility (WHO 1990a, 1990b). Early detection of ALRI can be hampered by the similarity of some of its symptoms to AURIs, which are less serious.

Communication is a central component of an effective ARI program. It is important that health providers communicate effectively with mothers and other child caretakers about the signs and symptoms of ARI and what actions need to be taken. Research suggests that new information is more likely to be acted upon when educators build upon existing beliefs and practices (Brieger, Ramikrishna, and Adeniyi 1983-84; Agyepong 1992; Brieger and Kendall 1992). Ethnographic studies on improving communication between health providers and mothers can contribute to the reduction of ARI mortality. The present study focused on obtaining specific information on ARI illness terms and identifying how primary caretakers of young children dealt with respiratory illnesses.

A key step in developing health education materials for ARI control programs is identifying local illness terms that can be used by health providers to communicate effectively with mothers and caretakers. Discovering the local terms for the way people view their world is the realm of cognitive anthropology. Methods of discovery include asking informants to perform a term listing or a pile sorting task. Since the 1960s, pile sort techniques have been used to discover how people conceptualize and classify items in a variety of subject areas and situations, such as: grammatical strings (Shipstone 1960); English kin terms (Romney and D'Andrade 1964); differences between types of sorting tasks (Mandler and Pearlstone 1966); verbal concepts (Miller 1969); Navaho food terms (Perchonok and Werner 1969); occupational terms (Burton 1972); role terms (Burton and Romney 1975); Spanish "to have" verbs (Truex 1977); personality descriptors (White 1978); sentences about success or failure (Romney, Smith, Freeman, Kagan, and Klein 1979); pilot errors (Roberts, Golder, and Chick 1980); and disease concepts in a Mexican village (Weller 1984). In a term listing task, the respondent is asked to list the items in a particular subject area (domain). In a typical pile sorting task, respondents are given cards containing

illness terms and they are asked to sort these items into piles that "go together." The cards are numbered on the back. Respondents are told that items can be sorted into as many or as few piles as necessary to complete the task. After the informant is finished sorting, the researcher writes down the card numbers and to which piles they were assigned. Informants usually enjoy the pile sorting activity, which can be conducted with both literate and non-literate respondents.

A method similar to pile sorting is the Q-sort, which had its origins in psychology in the 1930s (Stephenson 1953). However, the Q-sort restricts informants to a specific number of piles whereas respondents in the present study were asked to do an unconstrained pile sort. Sorting tasks are not only appropriate for determining individual cognition, but have been considered the "method of choice" for exploring attitudes, feelings, beliefs, values, and other dimensions of subjective phenomena (Dennis 1986).

Methods

The 1986 census divides Swaziland administratively into 1,080 census enumeration areas. In the current study, a list of the 174 rural and urban census enumeration areas included in the 1988 Swaziland Family Health Survey (SFHS) (Swaziland Ministry of Health 1989) was used as a sampling frame. Using the list of enumeration areas from the SFHS, we systematically selected every 10th enumeration area for our study. This resulted in a total of 17 areas.[1] For each area, a map with prenumbered homestead areas was obtained from the Department of Economic Planning and Statistics. After randomly selecting the first homestead in each area, next nearest homesteads were visited until two mothers of children under the age of 5 had been interviewed. In one area, inclement weather precluded completion of the second interview. Each mother was asked in the interview to identify the health facility and the traditional healer they would contact if their child became ill. One health care provider was interviewed at each of the 17 health facilities identified by mothers.[2] All healers identified by 25 of the mothers agreed to be interviewed (8 mothers did not name a healer).

For the pile sorting task, a list of 30 ARI-related illness terms was elicited from a group of Swazi healers during a focus group discussion at a primary health care training session. Researchers commonly ask informants to sort a list of terms which has been elicited by informants in a free

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1 This paper is based on a portion of the data from the Swaziland Health Seeking Behaviors Study, October 1990. In our original study design, a sample of 10% of SFHS enumeration areas would have yielded approximately 370-400 individual interviews, which was the desired number of interviews for other portions of the research.

2 There was no problem selecting prospective respondents in the rural clinics because there was only one staff nurse on duty at the time of the interviews. However, when urban hospitals were identified as the usual source of medical care, we obtained permission from the sister or matron to interview one of the nurses who was on duty and who was responsible for seeing young children in the outpatient clinic.

list. The healers' list of terms (Table 1) was used in the pile sort activity for the present study because healers are perceived by ethnographers as having in-depth knowledge of folk medical terminology in developing countries (Garro 1986). The siSwati illness terms elicited from the group of healers were written on separate cards, with card numbers on the back. Using those cards, respondents in this study were asked to do a typical pile sort (as described above) and were asked why they sorted the cards as they did. Cards were read to those respondents who could not read. SiSwati illness terms sorted by our respondents were translated into English (and verified by back-translating into siSwati). Because of translation, some terms for respiratory illnesses may seem inappropriate. For example, "lower sternum I" is a loose translation of a siSwati illness term that refers to a respiratory illness in the lower sternum area. "Lower sternum II" is another siSwati illness term that is also manifested in the lower sternum area but this illness is more severe than "lower sternum I".

Table 1. List of siSwati ARI terms included in the pile sort activity. Swaziland Health Seeking Behaviors Study, October 1990.

#	SiSwati term	Approximate English translation
1	*uyashisa*	fever
2	*emehlo labomvu*	red eyes
3	*uyakhwehlela*	cough
4	*uyachucha*	chills
5	*emehlo ayakhala*	teary eyes
6	*uyavimbana*	blocked nose
7	*ubulaya yinhloko*	headache
8	*uba nemafinyila lamanengi*	runny nose
9	*uphelelwa ngemandla*	weakness
10	*uphefumulela etulu*	fast breathing
11	*umkhuhlane*	flu/cold
12	*inyongo*	excess bile
13	*umoya we mkhuhlane*	something in the air
14	*yimbo*	small flu
15	*lucabangu*	lower sternum I
16	*silambe*	lower sternum II (worse)
17	*sidliso*	indigestion
18	*kucinana*	difficulty breathing
19	*tilondza emaphashini*	lung sores
20	*emahlaba*	chest pain
21	*kufocoka kwesilembe*	chest indrawing I
22	*kuba nesigodzana*	chest indrawing II (worse)
23	*kugogana kwemahlombe*	painful cough
24	*yimbo lenkulu*	big flu
25	*sigodzi sesilembe siba sikhulu*	deep chest indrawing
26	*kubola kwemaphaphu*	rotten lungs
27	*uphelelwa ngemanti*	dehydration
28	*imhlitiyo*	low heartbeat
29	*kuvela*	dilated veins
30	*kuvela kwetimbambo*	ribs showing

Data Analysis

Pile sort data for each individual were recorded and entered into a data file. Each data record included a respondent identifier and a record of how each informant performed the pile sort exercise, using the card numbers on the back of the cards. The sorted cards had been numbered on the back. After the informant sorted the cards, the researcher recorded the card numbers and the piles to which the informant assigned them. All the records for the health providers and traditional healers and 29 out of 33 for the mothers were complete and were therefore available for pile sort analysis. The pile sort, cluster analysis, and multidimensional scaling (MDS) features of the ANTHROPAC software (Borgatti 1991) were used in the analysis. Cluster analysis and MDS were used to provide a visual display of the pile sort data.

The pile sort analysis program converts each respondent's data into a one-zero item-by-item matrix, called a similarity matrix, which indicates whether each pair of items is placed in the same pile. After producing a similarity matrix for each respondent, an aggregate proximity matrix composed of data from all individual matrices is produced.

Results of the pile sort obtained from interviews of the health providers, healers, and mothers were analyzed separately, then compared. Field notes of the researchers and responses to structured questions in the interview guide were used to explain differences in illness categories displayed by the cluster analysis and the MDS mapping.

ANTHROPAC's cluster analysis program is an iterative process. The program takes the most strongly correlated pairs of illness terms (the ones sorted together most often by informants) groups them, then starts over again until it finds the next closest correlations. The process continues until all the data are grouped. The cluster analysis program uses the aggregate proximity matrix to summarize and present the respondents' view of ARI illness terms. The program's output is a cluster diagram that can be used to interpret MDS maps. In each cluster tree diagram, the terms most often grouped together by informants are located next to one another and connected by lines. The smallest groups (the core units) consist of two terms. Closely related terms are added to these core units, forming clusters which are based on how often informants sorted the terms into the same piles with the core units. This process of connecting groups of terms continues until the cluster tree illustrates the overall pattern that informants used to sort illness terms. Thus, cluster analysis represents "interrelationships in terms of a tree structure in which closely related items occur in the same branch with unrelated items occurring in more remote branches" (Romney, et al. 1979:307).

Multidimensional scaling "is a tool for quantitative analysis indexing similarity in judgments" (Romney et al. 1979:307). The MDS program uses the aggregate proximity matrix and produces a two-dimensional map of the data reflecting how they were sorted by the informants. In this MDS program, all relationships among all items are considered simultaneously and the items are mapped based on their proximity to each other. The spatial distance model of MDS "maps objects as points in a multidimensional space such that the more similarly objects are perceived, the nearer they are positioned in the spatial map" (Weinberg 1991:12). Thus, items that are

closest together on an MDS map are items considered similar by the informants, while dissimilar items are placed farther apart.

Since both cluster analysis and MDS use the same aggregate proximity matrix as input, the cluster tree diagrams and the MDS maps, respectively, show similar results. Using both MDS and cluster analysis to interpret data is a common practice among researchers in a variety of situations (Driver and Sanday 1971; Arabie and Boorman 1973; Burton and Romney 1975; White 1978). The cluster analysis results can indicate the actual connections between items near each other on an MDS map.

To clarify what we mean when we use certain terms in this paper, we provide some definitions:

Core unit: a pair of terms that informants frequently place in the same pile because of their similarity and strong correlation. These terms are grouped together at the far right of the cluster tree diagram.

Cluster: terms having a core unit and at least one other term linked to it on the basis of their similarity to each another.

Group: several clusters that are correlated to form a cohesive unit (such as Group I, Group II). On a cluster tree diagram, a group is not connected by lines to any other group.

In the present study, we used pile sorting as one of three methods for eliciting information on ARI beliefs and practices. Other methods included using two hypothetical scenarios to elicit illness terms and treatment practices, and using illness terms to elicit signs, symptoms, and treatment practices. The pile sort results will be reported here. Results from the other methods are reported elsewhere (Wilson, Nxumalo, Magonga, Shelley, Parker, and Dlamini 1993).

Results

Interviews were completed in the 17 areas with 33 mothers (29 were available for pile sort analysis), 17 health providers (all female except for one male nurse), and 13 healers (both men and women). Sociodemographic information about all the informants and other questions asked of informants can be found in Wilson et al. (1993).

The data, as mapped by ANTHROPAC's cluster analysis and the MDS programs, show how mothers, healers, and health providers group illness terms (Figures 1-6). Figures 1, 3, and 5 represent the cluster analysis output (cluster tree diagrams) and Figures 2, 4, and 6 represent the corresponding MDS maps.

Mothers

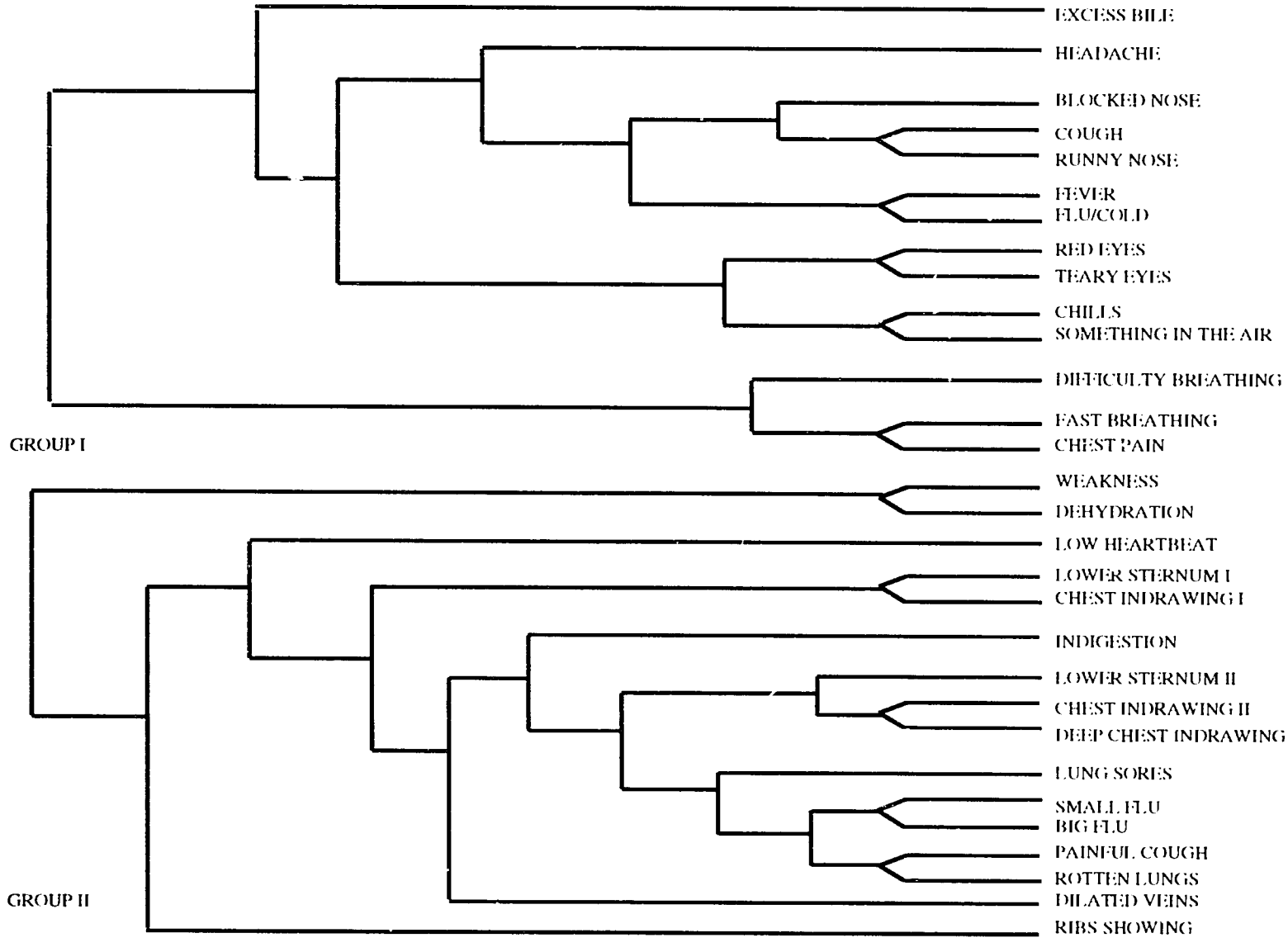
Cluster tree diagrams resulting from the pile sort that mothers did are shown in Figure 1. The core units at the right side of the figure (e.g., cough and runny nose; fever and flu/cold) consist of terms grouped together by most informants; therefore, we joined these terms together at the first level of clustering. For example, blocked nose joined to the cough/runny nose core unit at the next level of clustering means that blocked nose, cough, and runny nose are often grouped together, but not as often as the grouping of only cough and runny nose. The next terms to join this cluster are the core cluster of fever and flu/cold, and finally headache. Based on the pile sort data, each term, or core unit of terms, is added to the cluster and finally the cluster expands to encompass all terms sorted. However, in this tree diagram, it is evident that there are two separate groups represented (Group I and Group II) because there is no line linking these two groups (meaning that items in these Groups were very rarely sorted together). This pattern of sorting terms into two major groups is evident across all of the data sets.

Group I consists of siSwati illness terms that include signs and symptoms associated with upper respiratory tract infections (e.g., cough, runny nose, blocked or congested nose, fever, flu/cold, and headache). These symptoms were clustered together most often by mothers. Other signs (e.g., red eyes, teary eyes, chills, and "something in the air") are then added to the main cluster group. Excess bile is one of the later terms added to the cluster.

One of the last groups to be added includes fast breathing, chest pain, and difficulty breathing. These terms almost form a separate group because they are only weakly correlated with the other signs and symptoms in Group I. If they were more strongly correlated, they would have been brought into the cluster at an earlier stage. These three illness terms have no connection with the ones in Group II.

In Group II, "small flu" and "big flu" are sorted together most often by mothers, as are "painful cough" and "rotten lungs." These four terms and "lung sores" are joined together and form a small cluster. Other terms (deep chest indrawing, chest indrawing II, and lower sternum II) are drawn into the cluster at the next level. Next, indigestion and then "dilated veins" are each successively brought into the cluster. At this point, the cluster of "lower sternum I" and "chest

FIGURE 1. TREE DIAGRAM OF ARI TERMS BASED ON CLUSTER ANALYSIS RESULTS OF 29 INDIVIDUAL CARETAKERS' PILE SORTS. SWAZILAND HEALTH SEEKING BEHAVIORS STUDY, SWAZILAND 1990.



indrawing I" are added, and then "low heartbeat". "Ribs showing" is added next and then weakness and dehydration are added as the final terms in Group II.

ARI illness terms in Group I are perceived by mothers as being treatable at home while those that are in Group II are perceived as more serious, requiring treatment from a healer or health facility. However, because fast breathing, chest pain, and difficulty breathing are only weakly linked to the other Group I terms, these terms may be perceived by informants to be part of either large group. The MDS map of these data (Figure 2) shows the two main groups outlined with a solid line. The dotted line inside Group I shows the quasi-separate group of ARI terms.

Healers

Healers grouped ARI terms somewhat differently from mothers. For example, in Figure 3 (the healers' cluster diagram) and Figure 4 (the healers' MDS map), "small flu" and "big flu" were still sorted together as a core unit. However, healers placed these two terms in Group I, while mothers put these terms in Group II. In fact, the major core group for healers was composed of blocked nose and flu/cold, cough, "something in the air," "small flu," and "big flu." Other terms are added successively to this cluster, with fast breathing, difficulty breathing and headache added to complete Group I. Healers put chest pain in Group II, and not in Group I as the mothers did.

Group II for the healers has two main clusters. The first cluster begins with the core unit of "chest indrawing II" and "deep chest indrawing," adding to the core unit "lower sternum II," and finally the core unit of "lower sternum I" and "chest indrawing I." The second cluster begins with "ribs showing" and "rotten lungs" as a core unit. Painful cough is added next, then "lung sores," and finally dilated veins and dehydration. Those two clusters are joined together to form one large cluster. Chest pain is added to this large cluster next and then the core unit of weakness and low heartbeat. The final ARI term added to Group II is indigestion.

Health Providers

The cluster tree diagram (Figure 5) and the MDS map (Figure 6) representing how health providers grouped siSwati ARI illness terms suggest that there are several strongly correlated smaller clusters inside the two large groups. These clusters are composed of core units that are linked loosely to each other.

The patterns of clustering by health providers and healers in Group I were similar in that the following terms were clustered together: the core unit of blocked nose and runny nose plus flu/cold, cough, and "something in the air." Other terms (red eyes, teary eyes, fever, chills, and headache) also appeared in Group I. The latter five terms appeared in Group I for every cluster tree diagram and associated MDS map.

Figure 2. Multidimensional scaling of Swazi individual caretakers' view of respiratory illness terms

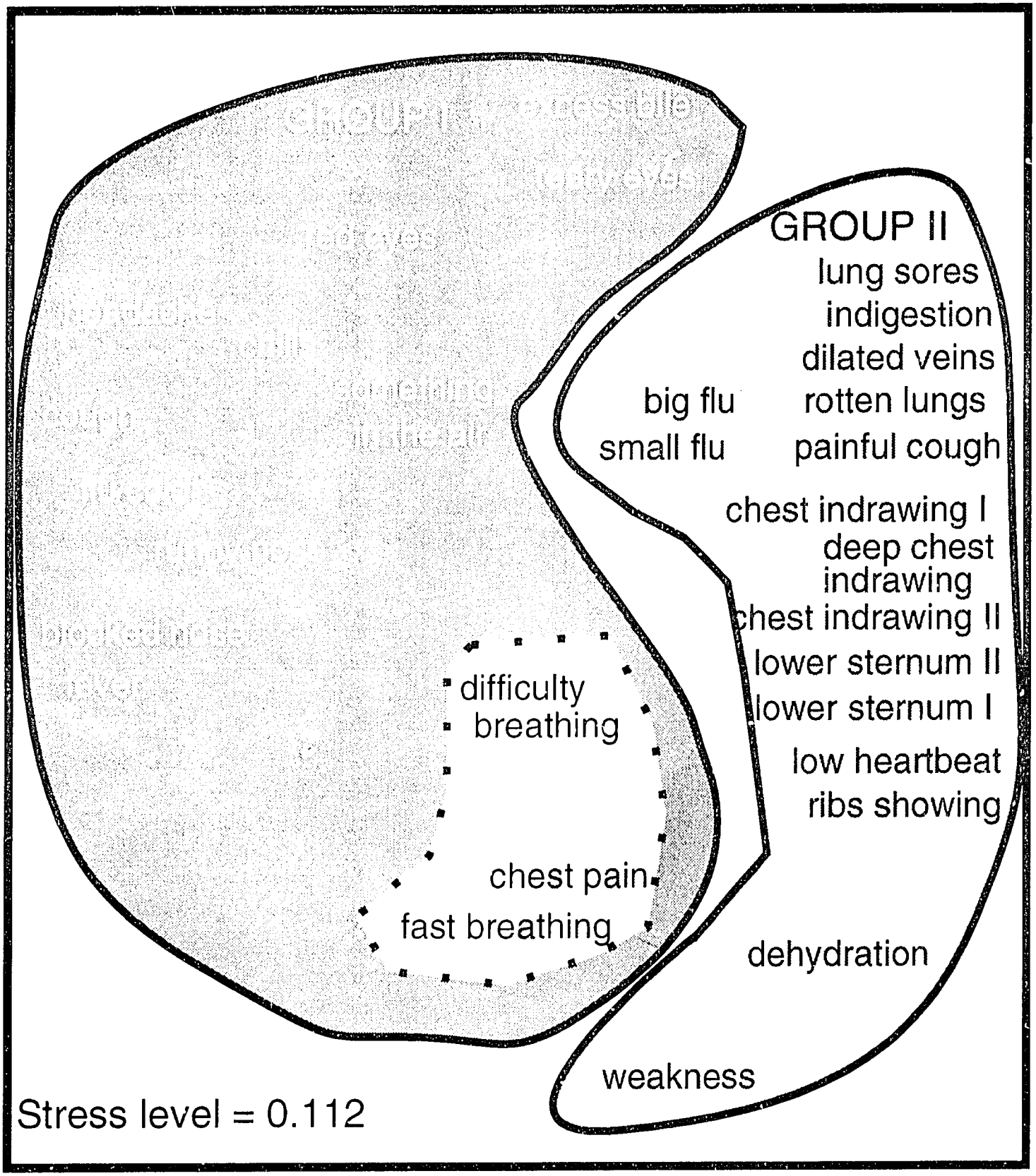


FIGURE 3. TREE DIAGRAM OF ARI TERMS BASED ON CLUSTER ANALYSIS RESULTS OF 13 TRADITIONAL HEALERS' PILE SORTS. SWAZILAND HEALTH SEEKING BEHAVIORS STUDY, SWAZILAND 1990.

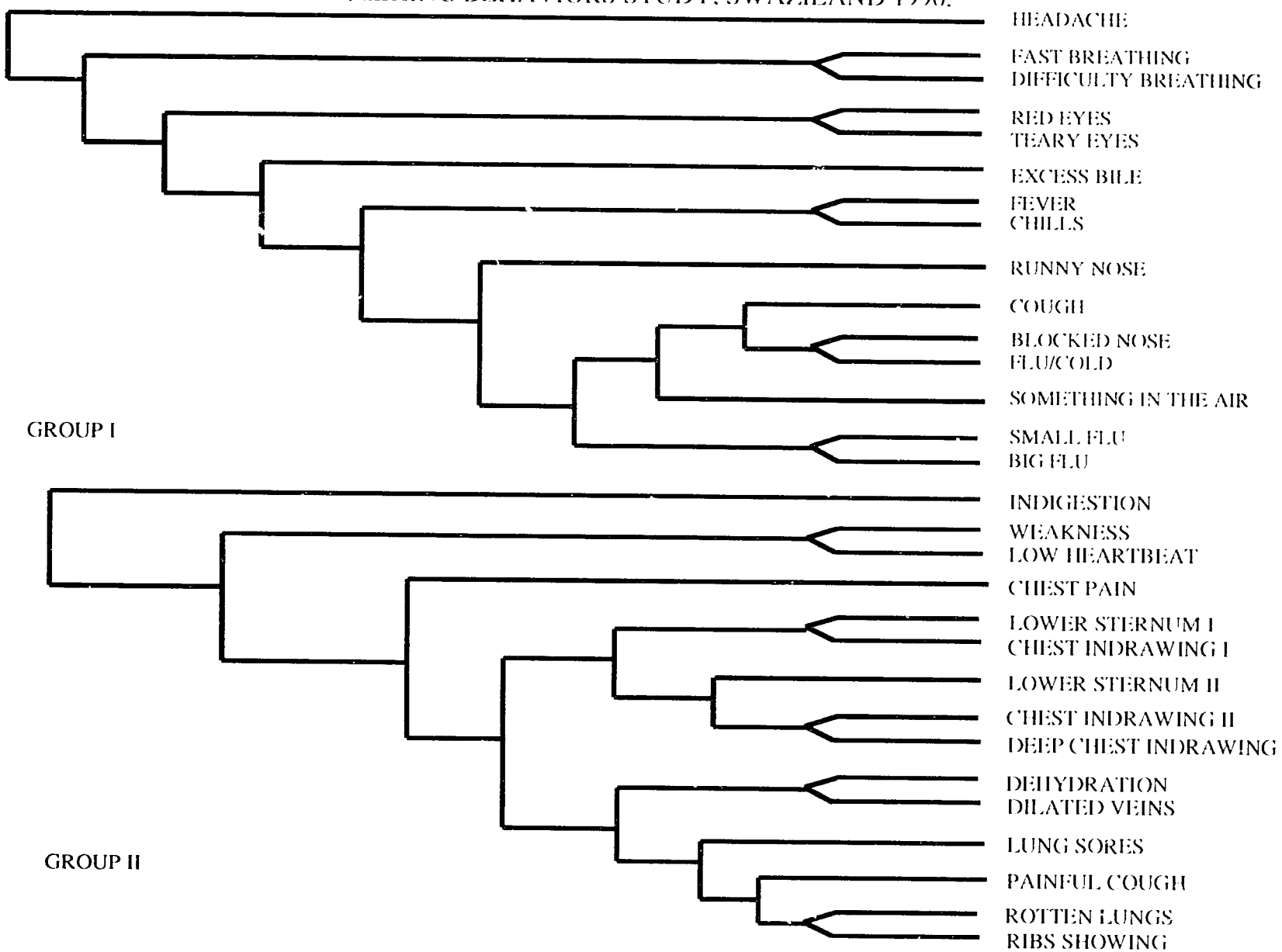


Figure 4. Multidimensional scaling of Swazi healers' view of respiratory illness terms.

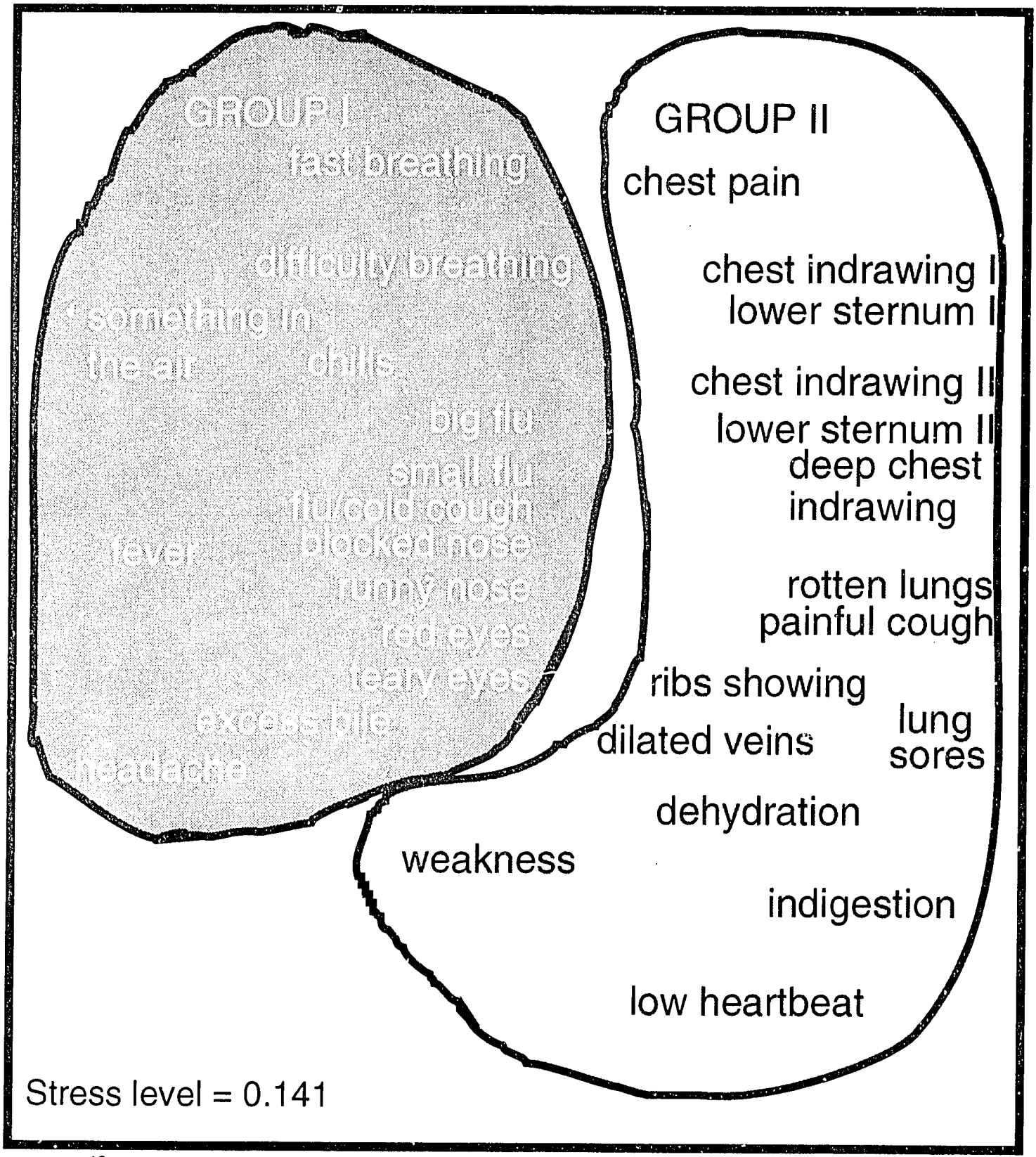


FIGURE 5. TREE DIAGRAM OF ARI TERMS BASED ON CLUSTER ANALYLSIS RESULTS OF 17 HEALTH PROVIDERS' PILE SORTS. SWAZILAND HEALTH SEEKING BEHAVIORS STUDY. SWAZILAND 1990.

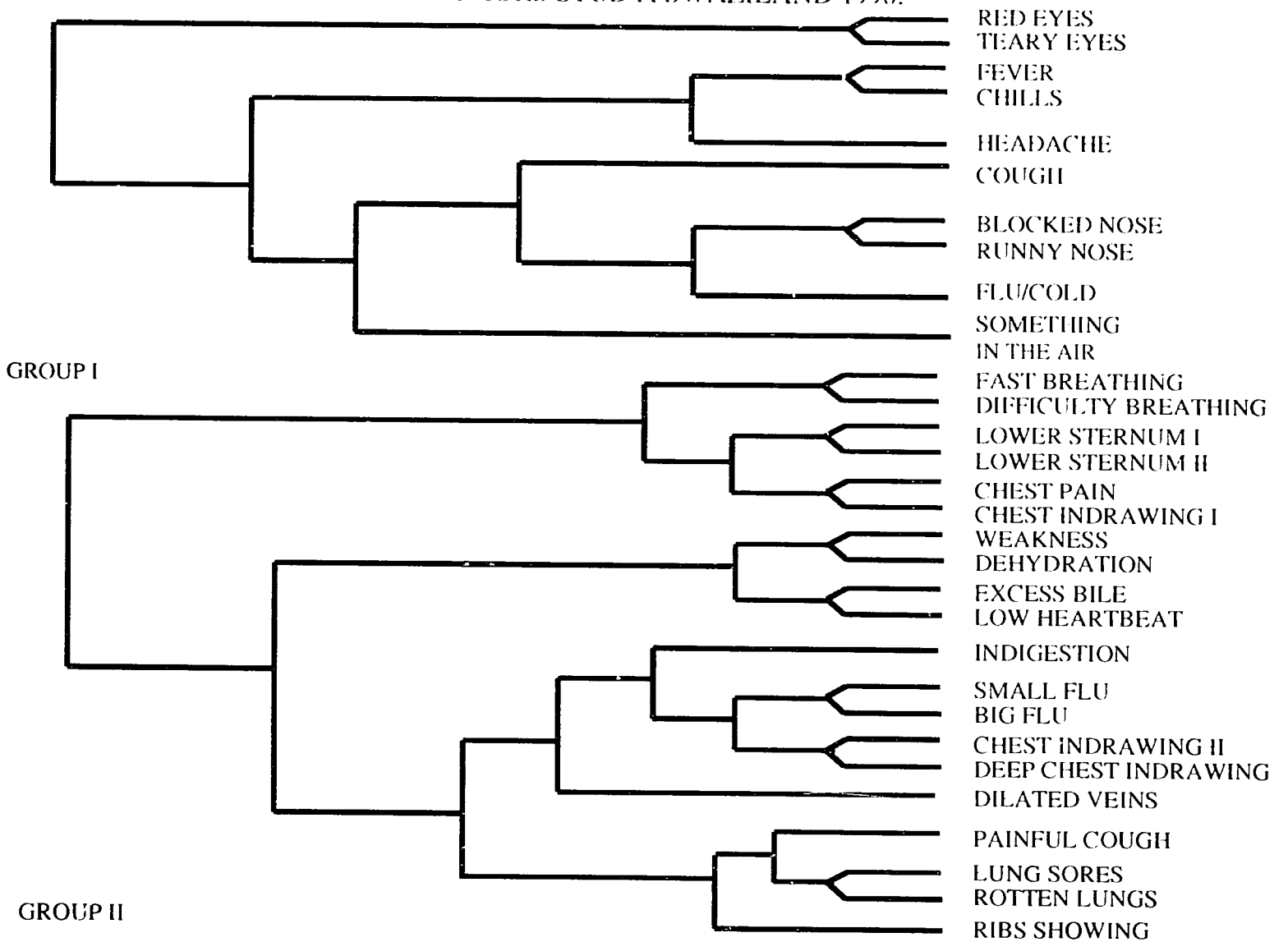
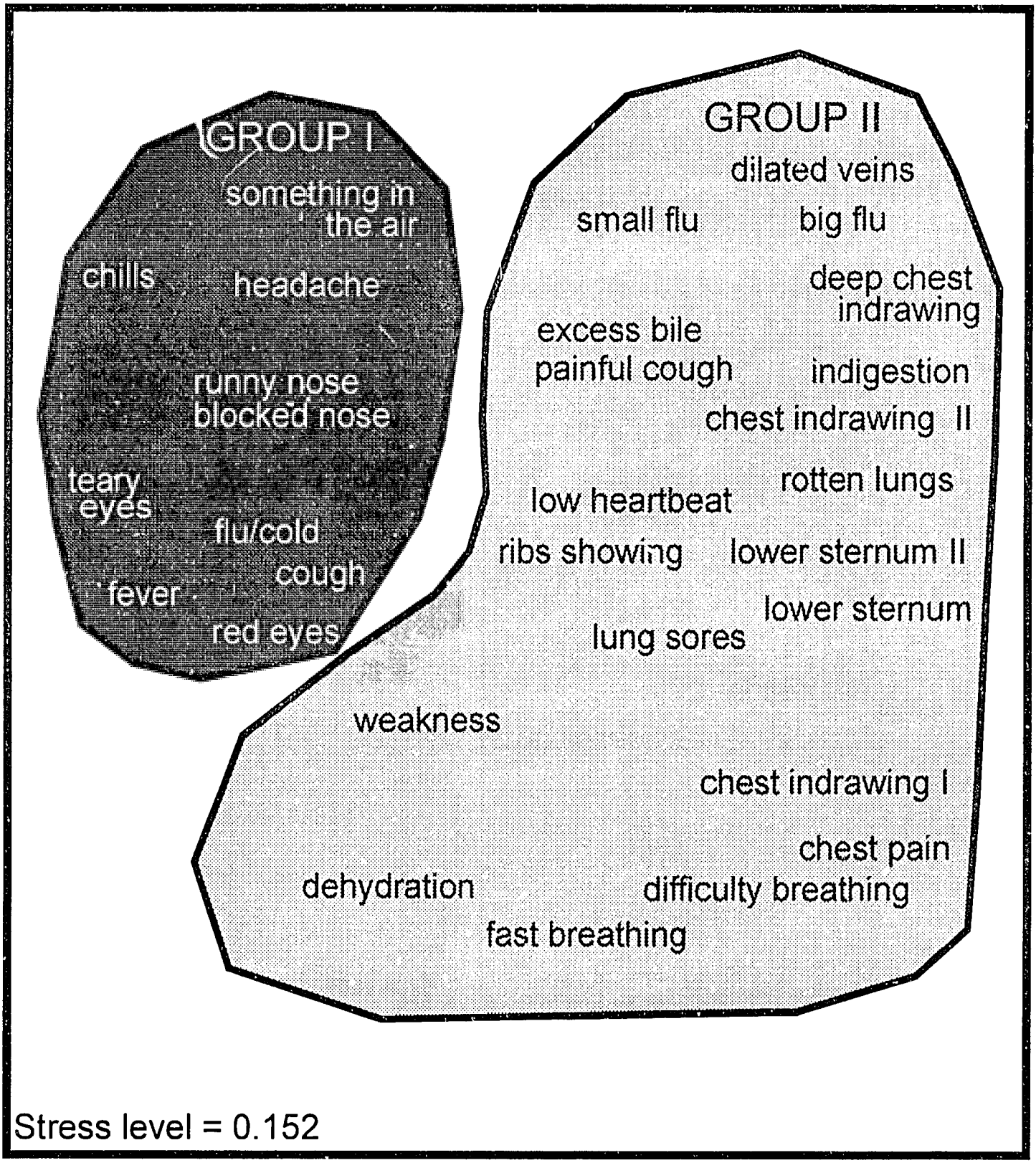


Figure 6. Multidimensional scaling of Swazi health providers' view of respiratory illness terms.



In Group II, four strongly correlated clusters contain terms that health providers associated with lower respiratory infections. In the first cluster, the core unit of chest pain and "chest indrawing I" are strongly correlated, as are the core unit of "lower sternum I" and "lower sternum II." Next, fast breathing and difficulty breathing are also sorted together often and are added to this cluster. Neither the mothers nor the traditional healers sorted these six terms into such a tightly correlated cluster. This pattern of clustering is similar to that expressed by mothers, for which it was almost a separate cluster.

A second small cluster with items strongly intercorrelated but loosely correlated to the rest of the illness terms in Group II includes weakness, dehydration, excess bile, and low heartbeat. A third cluster consists of "small flu" and "big flu," which is the core unit joined by "chest indrawing II" and "deep chest indrawing." Since health providers often reported unfamiliarity with the illness terms "small flu" and "big flu," the cluster analysis showed that this group of respondents felt these terms to have something to do with severe forms of chest indrawing. Indigestion and dilated veins are added to that third cluster before it is joined to a fourth small cluster formed by the core unit of "lung sores" and "rotten lungs," painful cough, and "ribs showing." When asked why they had grouped these items together, health providers explained that the illnesses in the fourth cluster were associated with chest ailments, lower respiratory tract infections, and sometimes tuberculosis.

The health providers sorted all lung difficulties into Group II (the more serious illness terms). This pattern contrasts with the sorting patterns of mothers and healers who sorted difficulty breathing and fast breathing into Group I (along with symptoms of less serious illnesses).

Discussion

Results of pile sorts with mothers, health providers, and healers in Swaziland suggest there are siSwati illness terms corresponding to many of the signs and symptoms of upper and lower acute respiratory tract infections. The respondents differentiated these terms into at least two distinct groups: one group included terms associated with the symptoms of common colds or flu that mothers manage at home, while another group includes terms that refer to more serious illnesses for which mothers usually seek help from traditional healers or health providers.

Traditional healers and mothers put fast breathing and difficulty breathing in the less serious ARI Group I. However, unlike mothers, healers grouped chest pain in the more serious Group II. Thus, the terms for rapid respiration and difficulty breathing or chest pain are considered "bridge terms" between severe and minor illnesses. Because these terms appear in Group I for some informants and in Group II for others, it seems that many of the informants are not sure whether to put these terms with serious or non-serious illnesses. This cognitive ambiguity is also apparent in the MDS maps, which show these terms to be on the periphery of the major clusters of illness terms. Thus, the cognitive boundary between Groups I and II is not always clear. Mothers may consider fast breathing and chest pain as intermediate illnesses or as symptoms with varying consequences, depending on circumstances. Cognitive ambiguity can cause problems (and perhaps death) when a caretaker is trying to decide which treatment to give a sick child.

Respondent ambiguity when sorting the terms "difficulty breathing," "fast breathing," and "chest pain" may reflect the dilemma of caretakers, health providers, and healers when diagnosing symptoms of AURI and ALRI. Pneumonia and its symptoms can mimic other less serious, transient illnesses, thus making diagnoses difficult in children, even by specialists. UNICEF (1988:2) notes that "most parents could have sought out low-cost help [50 cents worth of antibiotics] if they had known how to distinguish between a bad cough and a life-threatening lung infection." ALRI symptoms often develop from seemingly harmless respiratory infections (e.g., colds or flu) that are known to evolve into secondary, complicating illnesses such as pneumonia.

Ambiguity in the cognitive domain for the term "chest pain," a siSwati illness with symptoms resembling pneumonia, may also be explained by the nature of ARIs. The individual experiences of mothers of children with ALRI may contribute to this ambiguity since symptoms of ALRI (pneumonia) may vary depending on the age of the child. Although we used random selection to identify individual mother respondents who had a child under the age of 5, selection criteria did not specify inclusion of mothers whose child had had an ALRI. Regardless of where they live, most children have 5 to 8 episodes of ARI before reaching age 5 (Galway et al. 1987). However, the incidence and case fatality rate of ALRIs such as bacterial pneumonia are generally higher for children in developing nations (WHO 1990a; Campbell, Byass, Lamont, Forgie, O'Neill, Lloyd-Evans, and Greenwood 1989; Galway et al. 1987).

According to the health providers, the illness term *emahlaba* (chest pain) is associated with other pulmonary illnesses. However, mothers tend to group this term with fast breathing and not with other signs of severe ARI, while healers usually placed it in a group of illnesses related to severe disease, or alone, but not with fast breathing or difficulty breathing. When one healer was asked why he did not group this term with others, he said that *"emahlaba* is *emahlaba."*

When asked to explain their reasons for grouping illness terms together, most healers reported that red eyes and teary eyes are used to diagnose other illnesses. Health providers grouped these terms together because they refer to the same part of the body. In general, health providers grouped terms together based on the affected organs or part of the body (eyes, lungs, chest), a biomedical classification of disease terms. They also defined two major illness groups, although the clusters inside those major groups were so weakly correlated that they were almost individual groups. We would expect differences between folk and biomedical classification systems to be most clearly pronounced when comparing results of cluster analyses of community members (healers and mothers) with those of health providers. However, the differences were not as marked as we had expected, given the known differences between the Swazi folk explanatory model and the biomedical model of disease (Green 1985).[3]

Core ARI-related terms recognized by mothers and healers were *umkhuhlane* (flu/cold), *emahlaba* (chest pain), and *lucabangu* (lower sternum I). Mothers said that they either sought help for children with these symptoms at the health facility or from a healer. Health providers and healers reported treating less seriously ill children themselves, and referring those with the

[3] Green's study of childhood diarrhea noted differences in causation and classification between the folk and the biomedical definition of disease.

symptoms of severe ARI (rapid breathing, chest indrawing, fever, and cough) to a hospital or health facility. Traditional healers who treat ARI may use a therapy that could compromise the child's recovery (e.g., inhalation of smoke from burning herbs), and delay the child's caretaker from seeking effective, timely treatment at the health facility (Simoes 1990). Inclusion of healers in health education and case management training could be instrumental to lowering ARI-related mortality.

Caretakers may not link cough and fever to other ARI terms that indicate more severe illnesses (chest pain, chest indrawing, pain in the lower sternum, etc.). WHO-recommended diagnostic criteria for ALRI in children 2 months to 5 years of age include cough, difficulty breathing, chest indrawing, central cyanosis, or inability to drink. Infants less than 2 months of age may have the above symptoms, as well as apnoeic episodes, fever, stridor in a calm child, grunting, distended and tense abdomen, abnormal sleepiness, or difficulty waking (WHO 1990a). These results suggest that culturally appropriate health education messages might use the siSwati terms for chest pain, fast breathing, "lower sternum I", and "chest indrawing I" when referring to ALRI. Messages referring to these illness terms and those for mild ARI should be developed using the cognitive categories understood by mothers. Messages should be carefully pretested before being used in the national program. Special emphasis should be given to terms reflecting severe illness (ALRI) that mothers had tended to sort into Group I (reflecting AURI).

Although having a representative sample is not critical in a pile sorting activity (Bernard 1988), it may have been desirable to have had more respondents. However, the pile sort data were collected as one part of a larger study on health seeking behaviors in Swaziland, and time available for the ARI pile sorting task was limited. The 13 healers and 17 providers represented the entire "universe" mentioned by the respondent mothers.

Our method of selecting terms for the pile sort may have caused some bias in our results. Although the literature suggests that healers are more cognizant of terms in the illness domain than non-healers (Garro 1986), healers in Swaziland have specialties, one of which is childhood illnesses. The healers in our study were not all specialists in childhood illnesses. The quality of the results might also have been enhanced by conducting a few key informant interviews with healers, health providers, and mothers whose children had pneumonia; making a more careful differentiation between illness terms and symptoms; developing hypotheses based on those findings; then conducting the study. Data from the hypothetical case scenarios suggest that mothers often included other ARI terms [e.g., *sifuba semoya* (asthma), *malaleveva* (malaria), and *lishashati* (tonsillitis/throat infection)], which were not illness terms included in the pile sorting exercise (Wilson et al. 1993).

These results are one component of a national study that served as a program development tool in Swaziland. ARI terms were used to develop training materials for Swazi ARI trainers. During patient education, health providers used terms that mothers can understand, such as *emahlaba* for pneumonia. The use of the pile sorting technique was instrumental in understanding ARI terms used to denote severity. A key discovery was that mothers and traditional healers put fast breathing and difficulty breathing in the less serious ARI Group I. This should be an important focus for future health education in Swaziland.

Acknowledgements

This work was supported and made possible through the United States Agency for International Development (USAID) Africa Child Survival Initiative-Combatting Childhood Communicable Diseases (ACSI-CCCD) Project, Africa Regional Project (698-0421), Washington, D. C. The authors acknowledge the support of the following individuals and their institutions: Melinda Moore (Centers for Disease Control and Prevention) and Pertti Pelto (Professor Emeritus, University of Connecticut) for their continued interest and input throughout the various stages of this manuscript, and the assistance provided by Larry Brown, the Swaziland CCCD staff, the Swaziland MOH Health Education Unit in the implementation of the study. For editing and reviews, we are grateful to Virginia Sturwold, Judi Kanne, Andrew Vernon, Jennifer Bryce, Stephen Redd, and Stan Foster at the Centers for Disease Control and Prevention.

References Cited

Agyepong, I.A. 1992 Malaria: ethnomedical perceptions and practice in an Adangbe farming community and implications for control. Social Science and Medicine 35(2): 131-137.

Arabie, P. and S.A. Boorman 1973 Multidimensional scaling of measures of distance between partitions. Journal of Mathematical Psychology 10: 148-203.

Bernard, H.R. 1988 Research Methods in Cultural Anthropology. Newbury Park, CA: Sage Publications.

Borgatti, S. 1991 ANTHROPAC 3.2 Columbia: Analytic Technologies.

Brieger, W.R. and C. Kendall 1992 Learning from local knowledge to improve disease surveillance: perceptions of the guinea worm illness experience. Health Education Research 7(4): 471-485.

Brieger, W.R., J. Ramakrishna, and J.D. Adeniyi 1983-84 Yoruba disease classifications for planning in health care. International Quarterly of Community Health Education 4(2): 117-122.

Burton, M.C. 1972 Semantic Dimensions of Occupation Names. In Multidimensional Scaling: Theory and Applications in the Behavioral Sciences, Vol. 2. R.N. Shepard, A.K. Romney, S.B. Nerlove, eds. Pp. 55-71. New York, NY: Seminar Press.

Burton, M.C. and A.K. Romney 1975 A multidimensional representation of role terms. American Ethnologist 2: 397-407.

Campbell, H., P. Byass, A.C. Lamont, I.M. Forgie, K.P. O'Neill, N. Lloyd-Evans, and E.M. Greenwood 1989 Assessment of clinical criteria for identification of severe acute lower respiratory tract infection in children. The Lancet 1: 297-299.

Dennis, K. 1986 Q methodology: relevance and application to nursing research. Advances in Nursing Science 8: 6-17.

Driver, H.E. and P.R. Sanday 1971 Factors and clusters of kin avoidances and related variables. In Explorations in Mathematical Anthropology. P. Kay., ed. Pp. 269-279. Cambridge, MA: MIT Press.

Galway, K., B. Wolff, and R. Sturgis 1987. Child Survival: Risks and the Road to Health. Institute for Resource Development at Westinghouse. The Demographic Data for Development Project.

Garro, L.C. 1986 Intracultural variation in folk medical knowledge: a comparison between curers and noncurers. American Anthropologist 88: 351-370.

Green, E.C. 1985 Traditional healers, mothers and childhood diarrheal disease in Swaziland: the interface of anthropology and health education. Social Science and Medicine. 20: 277-285.

Mandler, G. and Z. Pearlstone 1966 Free and constrained concept learning and subsequent recall. Journal of Learning and Verbal Behavior 5: 126-131.

Miller, G.A. 1969 A psychological method to investigate verbal concepts. Journal of Mathematical Psychology 6:169-191.

Perchonock N. and O. Werner 1969 Navaho systems of classification: some implications for ethnoscience. Ethnology 8: 229-242.

Primary Health Care Project 1990 Swaziland ARI Position Statement, 1990. Mbabane, Swaziland.

Roberts, J.M., T.V. Golder, and G.E. Chick 1980 Judgment, oversight, and skill: a cultural analysis of P-3 pilot error. Human Organization 39: 5-21.

Romney, A.K. and R.G. D'Andrade 1964 Cognitive Aspects of English kin terms. American Anthropologist 66: 146-170.

Romney, A.K., T. Smith, H.E. Freeman, J. Kagan, and R.E. Klein 1979 Concepts of success and failure. Social Science Research 8: 302-326.

Shipstone, E.I. 1960 Some variables affecting pattern conception. Psychological Monographs 74: 1-40.

Simoes, E.A.F. 1990 ARI Swaziland Pneumonia Study: July-August 1989. Preliminary Report on the Use of the WHO ARI Protocol. Unpublished report.

Stephenson, W. 1953 The Study of Behavior: Q-Technique and Its Methodology. Chicago, IL: University of Chicago Press.

Swaziland Ministry of Health 1989 Swaziland Family Health Survey (1988). Mbabane, Swaziland.

Truex, G.F. 1977 Measurement of intersubject variations in categorizations. Journal of Cross-Cultural Psychology 8: 71-82.

United Nations Children's Fund 1988 The State of the World's Children, 1988. Oxford: University Press.

References Cited

Weinberg, S.S. 1991 An introduction to multidimensional scaling. Measurement and Evaluation in Counseling and Development 24: 12.

Weller, S.C. 1984 Consistency and consensus among informants: disease concepts in a rural Mexican village. American Anthropologist 86: 966-975.

White, G. 1978 Ambiguity and ambivalence in A'ara personality descriptors. American Ethnologist 5: 334-360.

Wilson, R.P., M. Nxumalo, B. Magonga, G.A. Shelley, K.A. Parker, and Q.Q. Dlamini 1993 Diagnosis and management of acute respiratory infections by child caretakers, healers and health providers in Swaziland, 1990-1991. (forthcoming)

World Health Organization 1990a Acute respiratory infections in children: Case management in small hospitals in developing countries. A manual for doctors and other senior health workers. Geneva: WHO.

World Health Organization 1990b ARI: Programme for control of acute respiratory infections. Interim Programme Report. Geneva: WHO.

World Health Organization 1992 ARI: Programme for control of acute respiratory infections. Fifth Programme Report, 1990-1991. Geneva: WHO.