

Peruvian mothers' knowledge and recognition of pneumonia in children under 5 years of age

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ABSTRACT

Objective. To assess Peruvian mothers' knowledge and recognition of pneumonia in children under 5 years of age, the mothers' attitude toward seeking medical help if they had a child with signs of pneumonia, and their perception of a Government of Peru pneumonia campaign.

Methods. In this cross-sectional study, 501 mothers were selected randomly from 20 low-income communities of the metropolitan area of Lima, Peru, and were interviewed between June and August 2000. Using SPSS software, descriptive statistics were applied to summarize the demographic data and the data regarding the mothers' knowledge of pneumonia and recognition of signs of the disease. Cross-tabulations and chi-squares were done to assess relationships between variables and to make comparisons.

Results. About 84% of the mothers said that they knew what pneumonia is. Most believed that pneumonia is dangerous. A majority (58.7%) indicated that pneumonia is caused by lack of parental care. Only 28.9% believed that a virus causes the disease. More than 80% correctly picked rapid breathing and/or chest retraction from a list of possible signs and symptoms of pneumonia, and 94.6% said they were ready to take their child to the closest health center if they thought their child had pneumonia. Although 57.1% said they had heard about the Government of Peru pneumonia campaign, 69.3% of these mothers said they could not recall the motto of the campaign. Mothers who reported having heard of the campaign through TV were more likely than other mothers to correctly recognize the two major signs of pneumonia presented in the campaign.

Conclusions. Although the percentage of mothers believing they can recognize pneumonia through rapid breathing and chest retraction seems to have increased in recent years, there is still a sizable percentage of mothers who remain uninformed about pneumonia and its possible fatal consequences. Efforts need to continue to educate Peruvian mothers about the causes, recognition of the signs, and treatment of pneumonia. The results suggest that the Government of Peru pneumonia campaign should use television much more, as well as the health centers, where most of the mothers receive medical attention and health information.

Key words

Respiratory tract infections; children's health; health education; knowledge, attitudes, practice; Peru.

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As of December 1998 Peru had 24 371 000 inhabitants, of whom 34.9% were below the age of 14 years, and only 4.5% were 65 years old or older (1). Of every 10 Peruvians, 7 live in cities, while 3 live in rural areas. Lima,

Peru's capital, currently contains 29.1% of the total population and is the main pole of migrant attraction (2). In Peru, 75 000 mothers who are under 20 years of age give birth annually. From 1980 to 1995 the number of births per woman declined from 5 to 3.2 (3).

The infant mortality rate in 1999 was 43 per 1 000 live births (2), whereas in 1994 the mortality rate of children under 5 years of age was 74 per 1 000 (3). Acute respiratory infections (ARIs) are the main cause of morbidity and mortality in Peru among the general population. This is particularly true among children under 5 years of age and among the elderly. Pneumonia ranks first among health problems requiring attention in health centers and second among causes of mortality for children under 5 years old (4–6). The most vulnerable members of the population are children under 5 who live in poverty around the coastal cities, particularly Lima, which is the biggest coastal city and has the highest ARI incidence of any city in the nation (7).

In 1987, the Ministry of Health of Peru, with the support of the Pan American Health Organization (PAHO), the United Nations Children's Fund (UNICEF), and other international organizations, established the Acute Respiratory Infections Control Program (ARICP), with the purpose of preventing and controlling ARIs in children under the age of 5 years. Known as the Government pneumonia campaign (GPC), this program is still in operation to some degree. While the intrahospital mortality rate has shown an important decrease in recent years, the extrahospital mortality rate remains a serious problem (4). Among the health promotion programs used by the Peruvian Government to prevent death from pneumonia in children less than 5 years of age are the winter pneumonia campaigns, which have placed strong emphasis on respiratory infection control. Between 1999 and 2000, these campaigns were more aggressively carried out during the winter months, when deaths from pneumonia are usually higher. Regardless of when it was promoted, the central message of the government

campaign was the same: "*RESPIRACIÓN RÁPIDA, RÁPIDO AL CENTRO DE SALUD*" ("RAPID BREATHING, RAPIDLY TO THE HEALTH CENTER") (8). This message was disseminated via television (TV), radio, posted announcements, and other media.

Rapid breathing and, to a lesser extent, chest retraction are the two signs that have been promoted from the inception of the GPC program as indicators of pneumonia to motivate people to take their children to the closest clinic. Among the main results of the ARICP or the GPC intervention was that 40% of homes had identified the pneumonia risk signs and had taken the children to clinics in a timely fashion, according to a 1998 UNICEF report (9). However, it is unknown how Peruvian mothers perceive pneumonia issues such as the seriousness of the sickness, its causes and signs, and what they should do when a child has pneumonia, as well as how the mothers perceive some elements of the Government pneumonia campaign (GPC) such as its central message and the means through which they received this message.

Pneumonia death reduction in children under 5 years of age has been shown to be possible by improving recognition of the signs by parents, earlier presentation of children with these signs to health care facilities or to trained community health workers, availability of antimicrobial agents at the primary health care level, and rational decisions by health care workers about the use of these agents (10–14).

Although programs to improve care-seeking for children under 5 years of age with life-threatening acute illnesses, including upper respiratory infections, have been conducted in the past, some were not evaluated or measured for effectiveness (15). Nevertheless, current health education interventions aimed at persuading mothers to seek medical help for children with pneumonia and other life-threatening illnesses seem to be effective in reducing pneumonia deaths in their children (11, 16–25).

To build a better understanding of mothers' reaction to child pneumo-

nia, the World Health Organization (WHO) Child Health and Development Division has promoted focused ethnographic analyses based on qualitative research with small samples. Such analysis provides information on how families perceive and respond to pneumonia as well as what cultural factors affect care-seeking for children with signs of pneumonia (11, 12, 26–29).

This study had two main objectives: 1) to assess Peruvian mothers' knowledge of pneumonia, their perceptions of its causes, their ability to recognize the signs of pneumonia, and their behavior if they were to have a child with the signs and 2) to assess their memory of the central message used in the GPC, and the means through which they learned this message.

In addition to rapid breathing and chest retraction, which were the main signs promoted by the Government campaign, other signs are currently being emphasized and communicated to the public, by the nurses in the clinics and by pharmacists as well as on some of the pamphlets prepared for the GPC. These signs include fever, cough, and weakness.

MATERIAL AND METHODS

This observational study used a cross-sectional design. Two stages of assessment took place. In the first stage a set of open-ended questions was given to a group of 40 mothers for the purpose of helping define the questions for the larger, second stage. These initial questions concerned the mothers' knowledge and recognition of pneumonia as well as their behavior in case of having a child with signs of pneumonia.

In the second stage, using the responses from the first-stage group of mothers, a questionnaire was developed and used as the instrument for data collection with 501 mothers. This second-stage questionnaire included a set of 25 questions about knowledge and recognition of pneumonia, behavior in case of having a child with signs of pneumonia, and perception of the

Government pneumonia campaign (GPC). A set of 7 questions about demographics was also included. These 32 questions offered the mothers a total of over 100 possible responses, ranging from 1 to 21 answers per question. The mothers took approximately 15 minutes to complete the questionnaire. Mothers were interviewed in Spanish by trained interviewers, and their responses were written in on the questionnaire.

Subject population

The target population was mothers 18 years old or older with at least one child under 5 years old, who lived in an *asentamiento humano* ("human settlement," or HS) of the metropolitan area of Lima, Peru. An HS is a low-income community initially established "informally," that is, without formal title to the property.

The 40 mothers for the first stage of assessment were selected from the Huaycán HS. That HS is located in the Chaclacayo district, in the eastern zone of Lima, near the Carretera Central highway, 19 km from the city center of Lima, and close to the Peruvian Union University.

The second stage of assessment involved choosing 20 HSs where the finalized questionnaire would be administered. For that, we first worked with a list of Lima HSs that was provided by the Formalization Commission for Informal Property (FCIP) (*Comisión de Formalización de la Propiedad Informal*, or COFOPRI), which is in charge of registration, formalization, and filing for informal settlements. Four zones of the metropolitan area of Lima were identified: North, South, East, and Callao. Second, using random numbers generated by Microsoft Excel spreadsheet software (Microsoft Corporation, Seattle, Washington, United States of America), 20 HSs were selected: 6 from the North, 7 from the South, 6 from the East, and 1 from Callao. The number of HSs selected by zone was proportional to the number of housing lots in each zone. Third, using a house-numbered map for each

selected HS, 20 houses were randomly chosen. Fourth, the interviewer team identified the selected house *in situ* and checked if that particular house met the inclusion criteria of having a mother 18 years or older with at least one child under 5 years old. If the house met the criteria, the interviewer proceeded with the interview. If not, the interviewer flipped a coin to select a house to the left or right of the original house, until the required number of homes was checked.

With a sample of 501 mothers and alpha set at .05, this study would have adequate power (0.80) using chi-square analysis to detect relationships between mothers' perceptions of the GPC and their beliefs about pneumonia and seeking medical help for a child with pneumonia.

Data collection

Two professors from the Peruvian Union University Theology and Public Health Department collected data in May 2000 for the first stage of assessment. For the second stage of assessment one of the co-authors of this paper (CAG) trained a team of senior public health students at Peruvian Union University to assist him with the data collection. Data for this section were collected from June through August of 2000. The interviewers visited the selected houses, checked whether or not they met the criteria, and proceeded with the interview. At the end of the interview the interviewer thanked the mother, put the questionnaire in its envelope, and sealed the envelope in the presence of the mother. All the questionnaires were delivered to the investigator, and the interviewer did not have access to them after that point. At the end of the data collection period 501 mothers had been interviewed.

Each team member carried identification indicating that the interviewer was a representative of the Pneumonia and Children Survey sponsored by the Peruvian Union University of Lima, Peru, and Loma Linda University of California.

The survey was authorized by the Ministry of Health of Peru through the Director of the Personal Health Division, who had responsibility for ARI control of the country.

Data analysis

The final data were entered using the SPSS version 9.0 statistical software package (SPSS Inc., Chicago, Illinois, United States of America). Descriptive statistics and cross-tabulations were used to analyze the data and to assess relationships. The chi-square test was used to test the significance of variables in the equation and to make comparisons.

RESULTS

Demographic information from the 501 mothers who were surveyed is presented in Table 1.

Knowledge about pneumonia

As is shown in Table 2, 83.6% of the mothers said that they knew what pneumonia is. When these mothers were given a list and asked to check what pneumonia is, only 24.4% chose the "strong cold" alternative. Most mothers (87.7%) believed that pneumonia is highly or very dangerous, and 58.7% believed that pneumonia is caused by a lack of parental care. In addition, weather change (52.7%) and cold temperature (51.5%) were indicated as causes. Only 28.9% of mothers reported that a virus or germ causes pneumonia.

Recognition of pneumonia

Table 3 shows the mothers' responses to recognition of pneumonia. Most mothers said they would recognize pneumonia if their child had rapid breathing (82.4%) or if the child had chest retraction (81.0%). The mothers also pointed to other, congruent

TABLE 1. Demographic data on sample of 501 mothers, study of mothers' knowledge of pneumonia, Peru, 2000

Characteristic	No.	%	Characteristic	No.	%
Age in years			Religion		
18–20	33	6.6	Catholic	384	76.6
21–25	116	23.1	Adventist	13	2.6
26–30	135	27.0	Evangelical	46	9.2
31–35	94	18.7	Pentecostal	21	4.2
36–40	75	15.0	Jehovah's Witness	9	1.8
41–45	31	6.2	Other	5	1.0
46–50	9	1.8	No religious preference	23	4.6
51–63	8	1.6	Highest level of education ^c		
Current job			No schooling	5	1.0
Do not work for pay	251	50.3	Secondary school	116	23.1
Work part-time	66	13.0	Vocational school	230	45.9
Work full-time	47	9.4	Business school	58	11.6
Work on their own	137	27.3	University	60	12.0
Average income per week (of the 250 mothers who work) ^a			Graduate school	32	6.4
< 10 n.s. ^b	17	3.4	Number of children		
11–20 n.s.	30	6.0	1	155	30.9
21–30 n.s.	28	5.6	2	138	27.5
31–40 n.s.	20	4.0	3	111	22.2
41–50 n.s.	35	7.0	4 or 5	71	14.2
51–60 n.s.	23	4.6	≥ 6	26	5.2
61–80 n.s.	28	5.6	Current social status		
81–100 n.s.	24	4.8	Single mother	43	8.6
101–200 n.s.	36	7.2	Married	177	35.3
201–300 n.s.	9	1.8	Common-law relationship	260	51.9
			Separated, living alone	18	3.6
			Divorced, living alone	1	.2
			Widowed, living alone	2	.4

^a Percentages for average income add to 50% because the percentages are based on the total number of mothers rather than only on those mothers who work.

^b n.s. = nuevos soles; 1 n.s. = US\$ 0.29.

^c On the survey questionnaire, "primary school" was offered as one of the education levels, but no respondents chose it.

signs such as panting, chest retraction when the child inhales, rapid heart-beat, fever, and appearance of weakness. Only 5.4% of the mothers said that they were not sure how to recognize the presence of pneumonia in their children.

Seeking medical help

In terms of seeking medical help, most mothers (94.6%) indicated that they would take their child to the closest health center and 64.5% to the doctor if they thought their child had pneumonia (Table 4). There were small percentages of mothers who said they would take other actions such as taking the child to a pharmacist, using medicinal herbs and herbal baths as

well as using other alternative treatments or home remedies.

Mothers' perceptions of the Government pneumonia campaign

In this section of the questionnaire mothers were allowed to indicate more than one means through which they had received the message from the Government pneumonia campaign. Of the 57.1% of mothers who said they heard about the GPC, the majority of them (74.1%) said they heard it on TV, 53.5% said they were told at a clinic or hospital, 29.4% got it through posters put up in the clinics and on buildings in the city, 28% by radio, 26.6% by reading pamphlets, 7.3% from a friend or relative, and

5.9% through other means (e.g., flyers or by loudspeakers on cars).

When the interviewers invited the 501 mothers to recall the central message of the campaign, 347 of them (69.3%) could not recall it or did not respond. Only 154 (30.7%) of them gave some answer related to the message. Of these 154 mothers who were capable of recalling the message, most of their responses were associated with rapid breathing: 39 of them (25%) said "rapid breathing" directly, 16 (10%) said "panting," and 99 (65%) said "rapid breathing" combined with other signs. The actual message of the campaign was "RAPID BREATHING, RAPIDLY TO THE HEALTH CENTER."

As shown in Table 2, there was a relationship between mothers' report that they know what pneumonia is

TABLE 2. Knowledge of pneumonia and its causes among 501 Peruvian mothers and the relationship of that to their having heard about the Government of Peru pneumonia campaign, 2000

Knowledge	Heard about the campaign				Total		Chi-square	
	No		Yes		%	No.	P	P ^a
	Row %	No.	Row %	No.				
Know what pneumonia is								
Yes	73.5	158	91.3	261	83.6	419	< 0.0005	< 0.0005
No	20.5	44	8.0	23	13.4	67	NA ^b	NA
Never heard about pneumonia	6.0	13	7.0	2	3.0	15	NA	NA
What pneumonia is (multiple responses were allowed) ^c								
A mortal sickness	51.6	111	62.6	179	57.9	290	0.017	0.087
A dangerous sickness	43.3	93	60.5	173	53.1	266	< 0.0005	0.001
More serious than bronchitis	36.7	79	53.8	154	46.5	233	< 0.0005	0.001
A respiratory sickness	34.0	73	53.1	152	44.9	225	< 0.0005	< 0.0005
A strong cold	17.2	37	29.7	85	24.4	122	0.002	0.008
What causes pneumonia (multiple responses were allowed)								
Lack of care of parents	50.2	108	65.0	186	58.7	294	0.001	0.006
Weather change	42.8	92	60.1	172	52.7	264	< 0.0005	0.001
Cold temperature	46.5	100	55.2	158	51.5	258	0.058	0.349
A virus or germ	30.7	66	27.6	79	28.9	145	0.486	1.000
Other	17.2	37	12.2	35	14.4	72	0.124	0.744
Does not know	7.4	16	1.0	3	3.8	19	< 0.0005	0.001

^a Significance after applying Bonferroni adjustment; adjustment is applied per item type.

^b NA = not applicable; only the "yes" (know what pneumonia is) answers were factored into the equation.

^c In this question, the numbers, percentages, and P values are for the 419 mothers who answered "yes" to the previous question (know what pneumonia is).

TABLE 3. Recognition of pneumonia in child (multiple responses were allowed) by 501 Peruvian mothers and its relationship to having heard about the Government of Peru pneumonia campaign, 2000

Warning symptom or sign	Heard about the campaign				Total		Chi-square	
	No		Yes		%	No.	P	P ^a
	Row %	No.	Row %	No.				
Child breathes rapidly	76.3	164	87.1	249	82.4	413	0.002	0.042
Chest retracts in the "upper stomach zone"	38.7	157	61.3	249	81.0	406	< 0.0005	0.002
Child is panting	62.8	135	71.3	204	67.7	339	0.053	1.000
Chest is retracted when inhales	73.0	125	87.1	193	63.5	318	0.039	0.820
Child's heart beats rapidly	58.6	126	60.8	174	59.9	300	0.646	1.000
Child has fever	57.7	124	57.7	165	57.7	289	1.000	1.000
Child looks very weak	52.6	113	59.4	170	56.5	283	0.145	1.000
Child coughs	47.0	101	51.7	148	49.7	249	0.321	1.000
Child's chest makes snoring sounds	45.1	97	50.0	143	47.9	240	0.320	1.000
Child's stomach is retracted	42.8	92	51.0	146	47.5	238	0.071	1.000
Child has a dry mouth	40.9	88	51.7	148	47.1	236	0.019	0.393
Child does not have an appetite	42.8	92	45.5	130	44.3	222	0.586	1.000
Child cries more than usual	39.5	85	45.8	131	43.1	216	0.172	1.000
Child sweats	37.2	80	45.8	131	42.1	211	0.056	1.000
Child is dehydrated	34.9	75	46.9	134	41.7	209	0.008	0.167
Child chokes with cough	32.6	70	37.4	107	35.3	177	0.299	1.000
Child has pain	31.6	68	32.9	94	32.3	162	0.847	1.000
Child is irritable	28.4	61	33.2	95	31.1	156	0.284	1.000
Child gets red	20.9	45	32.9	94	27.7	139	0.003	0.072
Other	8.4	18	8.7	25	8.6	43	1.000	1.000
Not sure	9.8	21	2.1	6	5.4	27	< 0.0005	0.004

^a Significance after applying Bonferroni adjustment.

TABLE 4. What a mother would do if she thought that her child had pneumonia (multiple responses were allowed) and its relationship to having heard about the Government of Peru pneumonia campaign, among sample of 501 mothers, Peru, 2000

Action	Heard about the campaign				Total		Chi-square	
	No		Yes		%	No.	P	P ^a
	Row %	No.	Row %	No.				
Take child to the closest clinic	94.0	202	95.1	272	94.6	474	0.690	1.000
Take child to the doctor	55.8	120	71.0	203	64.5	323	< 0.0005	0.004
Talk to a pharmacist	13.5	29	16.4	47	15.2	76	0.381	1.000
Treat child with medicinal herbs	15.3	33	13.6	39	14.4	72	0.608	1.000
Give child an herbal bath	14.0	30	13.6	39	13.8	69	1.000	1.000
Make child sweat	10.7	23	9.8	28	10.2	51	0.767	1.000
Other	5.6	12	4.5	13	5.0	25	0.680	1.000
Pass a rabbit over child	2.3	5	3.8	11	3.2	16	0.444	1.000
Does not know	1.4	3	.3	1	0.8	4	0.319	1.000

^a Significance after applying Bonferroni adjustment.

and having heard about the pneumonia campaign. Those that said they know what pneumonia is were more likely to report having heard about the pneumonia campaign.

There is a relationship between having heard about the pneumonia campaign and all listed pneumonia concepts, that is, the variables shown in Table 2 under “what pneumonia is” and “what causes pneumonia.” Nevertheless, whether mothers heard about the pneumonia campaign was not related to their beliefs about what pneumonia is. There is no relationship between having heard about the pneumonia campaign and the mothers’ report of how dangerous pneumonia is. Mothers who had heard about the pneumonia campaign were also more likely than mothers who had not heard about it to indicate that lack of care of parents or weather change were causes of pneumonia. Mothers who had not heard of the campaign were more likely to indicate that they did not know the cause of pneumonia.

As can be seen in Table 3, of 20 listed pneumonia signs, only 2 of them showed a significant relationship with having heard of the pneumonia campaign. There was a direct relationship between having heard about the pneumonia campaign and recognizing rapid breathing or chest retraction in the “upper stomach zone” as a sign of

pneumonia. Finally, there was a direct relationship between the mothers’ having heard of the campaign and reporting that they were likely to take the child to the doctor if they believed that the child had pneumonia (Table 4).

Mothers indicated the media through which they had learned about the Government pneumonia campaign: TV, radio, being told at the clinic, posted announcements, etc. Of interest is how the particular medium through which they had heard of the campaign was associated with their recognition of the signs of pneumonia that were emphasized in that campaign: rapid breathing and chest retraction in the “upper stomach zone.” Using only mothers who had heard of the Government campaign through some source, we calculated contingency coefficients for these associations. The contingency coefficient is a statistic analogous to the correlation coefficient. It shows the strength of association between two categorical variables. We also attempted to assess which medium was most highly associated with recognition of each of the two signs, using logistic regression analysis. The results of all these analyses are shown in Table 5.

Based on the contingency coefficients, mothers who reported having heard of the campaign through TV or posted announcements were more

likely to recognize both signs than were mothers who had not heard of the campaign through these media. Being told at the clinic or having heard of the campaign on the radio was related to increased recognition of rapid breathing only. For both logistic regressions, the more exposure to media, the more likely the mother was to recognize the signs of pneumonia. However, the only media exposure that independently predicted either sign was recognition of rapid breathing by having heard of the program through a clinic or hospital. We ran an additional test to see if mothers’ believing that pneumonia comes from a virus was related to what they would do when they believed a child had pneumonia, but we found no relationship.

DISCUSSION

Of the 501 mothers surveyed, 16.4% said they either did not know what pneumonia is or they had never heard about pneumonia. Most of these Peruvian mothers (87.7%) believe that pneumonia is highly or very dangerous. The World Health Organization focused ethnographic studies suggest that in most cultures people distinguish between mild and severe ARIs (28). There were similar findings in Honduras, where mothers invariably

TABLE 5. Associations between media through which mothers heard of the Government of Peru pneumonia campaign and recognition of two correct signs of pneumonia, Peru, 2000

Sign/medium	Contingency coefficient		Odds ratio ^a	Logistic regression		P
	Coefficient	P		95% confidence interval for odds ratio ^a		
				Lower	Upper	
Rapid breathing						
Radio	0.101	0.024	1.855	0.790	4.355	0.156
TV	0.098	0.033	1.289	0.765	2.170	0.340
Posted announcement	0.095	0.039	1.269	0.539	2.986	0.586
Reading pamphlets	0.078	0.100	1.149	0.496	2.663	0.746
Friend or relative ^b	0.096	0.032	... ^b	... ^b	... ^b	... ^b
Clinic/hospital	0.146	0.001	2.181	1.133	4.196	0.020
Chest retraction in the "upper stomach"						
Radio	0.072	0.119	1.343	0.635	2.840	0.440
TV	0.095	0.036	1.383	0.836	2.285	0.207
Posted announcement	0.108	0.022	2.037	0.875	4.744	0.099
Reading pamphlets	0.063	0.205	1.079	0.494	2.360	0.848
Friend or relative	0.050	0.398	1.238	0.257	5.970	0.791
Clinic/hospital	0.055	0.210	1.004	0.578	1.746	0.988

^a Ratio of odds of correctly recognizing the indicated sign when mothers had heard of the government campaign through that specific medium to odds of correctly recognizing the sign if the mother had not heard of the campaign through the medium.

^b "Friend or relative" was not included in the logistic regression for the rapid breathing sign. The absence of any individuals who had heard about the campaign from a friend or relative and who did not correctly recognize this sign caused the standard error for this odds ratio to be wildly inflated.

considered pneumonia to be the most serious of the ARIs and said that children could die from it (27).

When asked about the causes of pneumonia, only 28.9% of the Peruvian mothers in our study said they believe that a virus or germ causes pneumonia, and few of them see poor nutrition as a cause of pneumonia. Peruvian mothers were influenced by their worldview regarding the perception of what causes pneumonia. The majority would feel responsible if their child had pneumonia. In many cultures there is a tendency to put the blame on the mother in cases of pneumonia in children (28). In our sample that responsibility is based on the belief that the cause of pneumonia is lack of care when the child is exposed to sudden weather change and/or to a cold temperature. The most commonly cited causes related to an external cold temperature are being exposed to cold air, removing a child's clothes when he or she is warm, exposing him or her to outdoor air in a sudden fashion, and bathing the child outdoors. Mothers

also cited causes related to an internal cold temperature such as the intake of cold foods and drinks. Cold, as a cause of pneumonia, was also cited by Honduran mothers (27) and by rural Bolivian mothers (12). Finally, in this study mothers cited only natural causes. This contrasts with most cultural models, in which pneumonia in very young children is not generally attributed to natural causes (28).

UNICEF reported that in 1995 40% of Peruvian mothers were able to recognize pneumonia signs such as rapid breathing and chest retraction (9). Results from our study, done 5 years after the UNICEF one, show that over 80% of the mothers know about these two signs. Reasons for this large increase could be the effect of the GPC, previous experience of mothers with a pneumonic child (22.4% of the participants in this study had had a pneumonic child previously), health promotion in hospitals and clinics, and communication among neighbors and relatives. In contrast, in studies of perceptions of pneumonia signs, Ethiopian and Pakistani mothers did not

recognize rapid breathing or chest retraction as serious signs of pneumonia (11, 25). Also, although Honduran mothers said that characteristic symptoms of pneumonia are breathing as if tired, pain in the chest, and high fever, none of these mothers mentioned chest retraction (27). The current Peruvian Government campaign emphasizes such signs of pneumonia as cough, fever, and weakness. However, when mothers in this survey were asked by interviewers to indicate signs of pneumonia, the mothers seldom indicated these ones from the newer Government campaign.

Most of the mothers in our study said that they would take their child to the closest clinic if they thought the child had signs of pneumonia. However, about 15% of mothers would use alternative methods such as talking to a pharmacist, treatment with medicinal herbs, and treatment with an herbal bath. Studies in two rural communities in Bolivia found that herbal teas were the most common remedies for ARI

(12). In addition, in our study a small percent said that if they believed the child had pneumonia, they would use treatments such as garlic teas and rubbing the child with eucalyptus ointment or Vick's VapoRub salve. They also said that they might cover the children with a thick cloth or blankets to cause them to sweat. In 1997 and 1998 it was found that in the metropolitan area of Lima 33% of householders who had any illness consulted with traditional medicine specialists, motivated by lower cost, cultural habit, and more trust than in physicians (30). Gove and Pelto (28) have remarked that the perspective of causes of acute respiratory illness may influence decisions about where to seek care first, or when to shift from one type of care to another. If cold temperature was indicated as one important cause for pneumonia, then doing the opposite, making the child sweat or providing heat to the child, will bring health. Current research shows that such hydrotherapy resources as a spa, sauna, and other thermotherapeutic methods have been used effectively in the treatment of children with ARI and asthma (31).⁵ However, to deal with a child who has signs such as rapid breathing and chest retraction, and

who lives in poor conditions, virtually the only way to save his or her life is by getting an appropriate dose of antibiotics. Here, the mothers' perception of cause should play an important role in the selection of appropriate solutions by health personnel who are involved with the program. However, we did not find in our study any relationship between believing that pneumonia comes from a virus or a germ and what a mother would do with a child with signs of pneumonia.

It is interesting that only 3.2% of the mothers in our study said they would pass a rabbit over the child. This small percentage may indicate that the GPC and living in a modern city such as Lima are decreasing the use of some traditional cultural healing techniques.

Mothers heard about the GPC mainly through TV and through a clinic or hospital. It seems that the clinic or hospital is effective as a place for providing health information to mothers. The reasons may be past experience with pneumonia treated in the clinic, information or education from health workers, posters displayed in the facilities, or talks with other patients. Among other means used in the Government campaign that a group of mothers reported were the announcements through speakers mounted on cars and one-page flyers that were handed out. This finding seems to show the potential for pneumonia campaigns to use that kind of inexpensive advertising to reach communities and families.

It is also possible that mothers learned the signs and symptoms of pneumonia through means other than the Government campaign. These might have included having experience with a pneumonic child, taking him or her to the closest clinic, or receiving the message through flyers while visiting a clinic or hospital for some other sickness. In addition, other factors could facilitate learning, such as talks among neighbors, information from relatives, and even gossip. Carrying out studies on those factors could benefit future ARI and pneumonia campaigns and also build the skills of health workers to inform, educate, and communicate (8).

Finally, although the percentage of mothers believing they can recognize pneumonia through rapid breathing and chest retraction seems to have increased as compared to a UNICEF study done in 1995, there is still a sizable percentage of mothers who remain uninformed about pneumonia and its possible fatal consequences. Efforts need to continue to educate Peruvian mothers about the causes, recognition of the signs, and treatment of pneumonia. This study suggests that the GPC should make greater use of television and health centers, where most of the mothers receive medical attention and health information. Mothers should be encouraged to seek medical help when a child has any of the signs of pneumonia, and particularly in the winter months when the problems are more acute.

⁵ Preisler B, Falkenbach A, Kluber B, Hofmann D. [The effect of the Finnish dry sauna on bronchial asthma in childhood]. *Pneumologie* 1990;44(10): 1185-1187. (From Medline Express[®], 1998, Abstract No. 91125999.)

REFERENCES

1. Peru, Instituto Nacional de Estadística e Informática del Perú. Perú en números [Internet site]. Available from: www.inei.gov.pe. Accessed 8 November 1999.
2. Peru, Instituto Nacional de Estadística e Informática. La población en el Perú. Resultados de la Encuesta Nacional de Hogares 1997-1998 [CD-ROM]. Lima: Centro de Documentación del INEI; 2000. (Biblioteca Electrónica No. 7).
3. Peru, Instituto Nacional de Estadística e Informática. Estado de la niñez, la adolescencia y la mujer en el Perú—1996. Lima: UNICEF, INEI; 1996.
4. Peru, Sub Programa de Control de la Infección Respiratoria Aguda. Directivas nacionales del Programa Nacional de Control de Infecciones Respiratorias Agudas: directiva no. 002: control y seguimiento de la neumonía [Internet site]. Available from: <http://www.minsa.gov.pe/subpcira/publicaciones.htm>. Accessed 30 June 2000.
5. Peru, Sub Programa de Control de la Infección Respiratoria Aguda. Presentación, objetivos [Internet site]. Available from: <http://www.minsa.gov.pe/subpcira/index.htm>. Accessed 8 November 1999.
6. Toledo J, Minaya P. Doctrinas, normas y procedimientos para el control de la infección respiratoria aguda, síndrome obstructivo

- bronquial y asma, en menores de 5 años: normas y vigilancia [Internet site]. Available from: <http://www.minsa.gob.pe/subpcira/publicaciones.htm>. Accessed 30 June 2000.
7. Peru, Instituto Nacional de Estadística e Informática. Perú: demanda de atención en servicios de salud, 1998. Educación, salud y empleo urbano: resultados de la Encuesta Nacional de Hogares 1997-1998 [CD-ROM]. Lima: Centro de Documentación del INEI; 1999. (Biblioteca Electrónica No. 1).
 8. Peru, Sub Programa de Control de la Infección Respiratoria Aguda. Directivas nacionales del Programa Nacional de Control de Infecciones Respiratorias Agudas: acciones de información, educación y comunicación (documento de trabajo) [Internet site]. Available from: <http://www.minsa.gob.pe/subpcira/publicaciones.htm>. Accessed 1 June 2000.
 9. United Nations Children's Fund. Calor de campaña: combatiendo la neumonía [Internet site]. Available from: <http://www2.rcp.net.pe/UNICEF/WAWA6/WAWA6-3.HTML>. Accessed 10 October 1999.
 10. Ryan GW, Martinez H, Pelto GH. Methodological issues for eliciting local signs/symptoms/illness terms associated with acute respiratory illnesses. *Arch Med Res* 1996;27(3):359-365.
 11. Muhe L. Mothers' perceptions of signs and symptoms of acute respiratory infections in their children and their assessment of severity in an urban community of Ethiopia. *Ann Trop Paediatr* 1996;16(2):129-135.
 12. Hudelson P, Huanca T, Charaly D, Cirpa V. Ethnographic studies of ARI in Bolivia and their use by the national ARI program. *Soc Sci Med* 1995;41(12):1677-1683.
 13. Shimouchi A, Yaohua D, Zhonghan Z, Rabukawaqa VB. Effectiveness of control programs for pneumonia among children in China and Fiji. *Clin Infect Dis* 1995;21(Suppl 3):S213-S217.
 14. World Health Organization. The Division of Diarrhoeal and Acute Respiratory Disease Control [Internet site]. Available from: <http://www.who.int/chd/publications/cdd/pofact77.htm>. Accessed 10 October 1999.
 15. World Health Organization. Improving family and community practices [Internet site]. Available from: <http://www.who.int/chd/report/CHDRReport96-97/CHAPTER4.html>. Accessed 10 October 1999.
 16. Deb SK. Acute respiratory disease survey in Tripura in case of children below five years of age. *J Indian Med Assoc* 1998;96(4):111-116.
 17. Banajeh SM. Outcome for children under 5 years hospitalized with severe acute lower respiratory tract infections in Yemen: a 5-year experience. *J Trop Pediatr* 1998;44(6):343-346.
 18. Amofah GK, Essegbey IT, Opoku SA, Oduro J. Perception of caretakers of pre-school children on acute respiratory infection (ARI) in a rural district in Ghana. *West Afr J Med* 1998;17(2):64-69.
 19. López-Bravo IM, Sepúlveda H, Valdés I. Acute respiratory illnesses in the first 18 months of life. *Rev Panam Salud Publica* 1997;1(1):9-17.
 20. Sáenz de Tejada S. Manejo de las infecciones respiratorias agudas (IRA) en una comunidad kaqchiquel de Guatemala. *Rev Panam Salud Publica* 1997;1(4):259-265.
 21. Chongsuvivatwong V, Mo-Suwan L, Tayakanonta K, Vitsupakorn K, McNeil R. Impacts of training of village health volunteers in reduction of morbidity from acute respiratory infections in childhood in southern Thailand. *Southeast Asian J Trop Med Public Health* 1996;27(2):333-338.
 22. Lye MS, Nair RC, Choo KE, Kaur H, Lai KP. Acute respiratory tract infection: a community-based intervention study in Malaysia. *J Trop Pediatr* 1996;42(3):138-143.
 23. Gunay O, Ozturk A, Ozturk Y. The impact of mothers' health education on the prevalence of acute respiratory infections in children. *Turk J Pediatr* 1994;36(1):1-5.
 24. Denno DM, Bentsi-Enchill A, Mock CN, Adelson JW. Maternal knowledge, attitude and practices regarding childhood acute respiratory infections in Kumasi, Ghana. *Ann Trop Paediatr* 1994;14(4):293-301.
 25. Kundi MZ, Anjum M, Mull DS, Mull JD. Maternal perceptions of pneumonia and pneumonia signs in Pakistani children. *Soc Sci Med* 1993;37(5):649-660.
 26. World Health Organization, Division of Child Health and Development. CHD interim programme report 1996: family and community practices [Internet site]. Available from: <http://www.who.int/chd/report/fcp.htm>. Accessed 8 November 1999.
 27. Hudelson P. The management of acute respiratory infections in Honduras: a field test of the Focused Ethnographic Study (FES). *Med Anthropol* 1994;15(4):435-446.
 28. Gove S, Pelto GH. Focused Ethnographic Studies in the WHO Programme for the Control of Acute Respiratory Infections. *Med Anthropol* 1994;15(4):409-424.
 29. Nichter M. Acute respiratory infection: introduction. *Med Anthropol* 1994;15(4):319-334.
 30. Peru, Instituto Nacional de Estadística e Informática. Perú: percepción de la medicina tradicional en hogares urbanos, 1997. Percepción de las familias urbanas sobre el ahorro, crédito, deporte, turismo, adelanto tecnológico y cultura: resultados de la Encuesta Nacional de Hogares 1997-1998 [CD-ROM]. Lima: Centro de Documentación del INEI; 1999. (Biblioteca Electrónica No. 2).
 31. Tochihara Y, Ohnaka T, Nagai Y. Thermal responses of 6- to 8-year-old children during immersion of their legs in a hot water bath. *Appl Human Sci* 1995;14(1):23-28.

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RESUMEN

Conocimientos de madres peruanas sobre la neumonía en niños menores de 5 años y capacidad para reconocer sus síntomas

Objetivo. Evaluar los conocimientos de madres peruanas sobre la neumonía y el reconocimiento de sus síntomas en niños menores de 5 años, la actitud de las madres hacia la búsqueda de asistencia médica cuando un hijo presenta signos de neumonía y percepción de las madres en torno a una campaña del Gobierno del Perú contra la enfermedad.

Métodos. En este estudio transversal, 501 madres fueron seleccionadas aleatoriamente en 20 comunidades pobres de la zona metropolitana de Lima, Perú, y fueron entrevistadas entre junio y agosto de 2000. Mediante el uso del programa SPSS, se aplicaron las estadísticas descriptivas para resumir los datos demográficos y los que guardaban relación con los conocimientos de las madres en torno a la neumonía y con su capacidad para reconocer los signos de la enfermedad. Se realizaron cálculos cruzados y de ji al cuadrado para determinar la relación entre variables y hacer comparaciones.

Resultados. Alrededor de 84% de las madres dijeron que sabían qué es la neumonía. La mayoría sabían que se trata de una enfermedad peligrosa. Una buena parte (58,7%) afirmó que la neumonía está causada por una atención inadecuada por parte de los padres. Solamente 28,9% creía que la neumonía está causada por un virus. Más de 80% identificaron correctamente la respiración rápida, la retracción torácica o ambas de una lista de posibles signos y síntomas de neumonía, y 94,6% dijeron que estaban preparadas para llevar a sus hijos al centro de salud más cercano si pensaban que el niño podía tener neumonía. Pese a que 57,1% dijeron haber oído de la campaña del Gobierno del Perú en torno a la enfermedad, 69,3% de estas madres no pudieron recordar el lema de la campaña. Las madres que dijeron haberse enterado de la campaña por la televisión fueron más propensas que las otras madres a reconocer correctamente los dos signos principales de neumonía presentados en la campaña.

Conclusiones. Pese a que en años recientes parece haber aumentado el porcentaje de madres que se sienten capaces de reconocer un caso de neumonía por la respiración rápida y retracción del pecho, sigue habiendo un porcentaje importante de madres que siguen careciendo de información sobre la neumonía y sus posibles consecuencias letales. Es necesario seguir educando a las madres peruanas sobre las causas de la enfermedad, sus signos y síntomas y su tratamiento. Los resultados indican que la campaña del Gobierno del Perú en torno a la neumonía debe hacer mayor uso de la televisión y de los centros de salud, donde la mayoría de las madres reciben atención médica e información de salud.

It is unusual for an epidemiologic study to provide positive proof of the "cause" of a disease, although the epidemiologic study which attempts to determine if some modification of environmental characteristics of a population produces predicted modifications of the disease pattern in the population, comes closest to accomplishing this goal. More often epidemiologic studies point the way to fruitful areas for definitive research into the causal factors of a disease. Such studies can point the way to its prevention long before the cause or cure for the disease is discovered.

[Es poco frecuente que un estudio epidemiológico suministre pruebas concluyentes sobre la "causa" de una enfermedad, aunque se aproxima a este objetivo aquel que trata de determinar si algún cambio en las características ambientales de una población produce las modificaciones previstas en el patrón de la enfermedad en esa población. Lo más común es que los estudios epidemiológicos señalen áreas propicias para efectuar investigaciones sobre los factores causales de una enfermedad. Tales estudios pueden indicar el camino para su prevención mucho antes de que se descubra la causa o cura de la enfermedad.]

Thomas R. Dawber, William B. Kannel y Lorna P. Lyell
An Approach to Longitudinal Studies in a Community: The Framingham Study
Annals New York Academy of Sciences 1963;107:539-55