



Tuberculosis health belief gaps of tuberculosis and suspected tuberculosis cases in New York City¹

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ABSTRACT. A non-randomized cross-sectional study measuring tuberculosis beliefs using a 51-item belief instrument divided into five health belief model constructs were conveniently administered to suspects for tuberculosis ($n = 89$) and active tuberculosis cases ($n = 110$) in a hospital in New York. The purpose of this study was to identify congruent/incongruent belief gaps via detailed item-analysis about tuberculosis among the target and to examine within group demographic differences in active educated tuberculosis cases ($n = 110$). Item analysis conducted on the target population revealed several beliefs gaps. Within group demographic differences of multivariate hotelling t registered statistical significance for religious beliefs ($p = .022$) and housing status ($p = .025$). Some Univariate F's constructs were significant based on religion namely: severity/efficacy ($p = .003/.024$) and housing (benefits $p = .002$) for 110 tuberculosis cases. The implications of these findings are discussed.

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KEY WORDS. Health Belief Model. Tuberculosis beliefs. African American. Suspects and tuberculosis cases. Cross-sectional study.

RESUMEN. Se realizó un estudio transversal no aleatorio en el que se evaluaban las creencias sobre la tuberculosis. Se empleó un instrumento de 51 ítem dividido en los cinco constructos del modelo de creencias de salud, que fue administrado a sujetos con una posible tuberculosis (n=89) y a casos de tuberculosis activa (n=110) en un hospital de Nueva York. El objetivo de este estudio fue identificar la congruencia/incongruencia de las creencias mediante el análisis detallado de los ítem sobre tuberculosis, con el fin de realizar comparaciones intragrupo sobre las diferencias demográficas en los casos activos de tuberculosis (n=110). El análisis de ítem realizado con la población estudiada mostró diferentes fallos en el sistema de creencias. Existían diferencias demográficas intragrupo según el análisis multivariado t de Hotelling, con significación estadística en cuanto a las creencias religiosas (p= 0,022) y el tipo de vivienda (p=0,025). Algunos que mostraban variación significativa en la prueba F estaban basados en la religión, como la severidad/eficacia (p=0,003/0,024) y en la vivienda (Beneficios p=0,002) en los 110 casos de tuberculosis. Finalmente, se discuten las implicaciones de estos hallazgos.

PALABRAS CLAVE. Modelo de creencias de salud. Creencias sobre tuberculosis. Afroamericanos. Sujetos con posible tuberculosis y con tuberculosis activa. Estudio transversal.

RESUMO. Realizou-se um estudo transversal não aleatório, no qual se avaliaram as crenças sobre a tuberculose. Utilizou-se um instrumento de 51 itens dividido nos cinco construtos do modelo de crenças de saúde, que foi administrado a sujeitos com uma possível tuberculose (n=89) e a casos de tuberculose activa (n=110) num hospital de Nova York. O objectivo deste estudo foi identificar a congruência/incongruência das crenças com base numa análise detalhada dos itens sobre tuberculose, com o fim de realizar comparações intra-grupo sobre as diferenças demográficas nos casos activos de tuberculose (n=110). A análise dos itens realizada com a população estudada mostrou diferentes falhas no sistema de crenças. Existiam diferenças demográficas intra-grupo segundo a análise multivariada t de Hotelling, com significação estatística quanto às crenças religiosas (p= .022) e ao tipo de habitação (p=.025). Algumas análises univariadas mostraram-se significativas no que diz respeito à religião, como a severidade/eficácia (p=.003/.024) e à habitação (Benefícios p= .002) nos 110 casos de tuberculose. Finalmente, discutem-se as implicações destes resultados.

PALABRAS CHAVE. Modelo de crenças de saúde. Crenças sobre tuberculose. Afroamericanos. Sujeitos com possível tuberculose e com tuberculose activa. Estudo transversal.

Introduction

The social, political, economic, financial, medical, and public health burden of tuberculosis infection and diseases is staggering. Tuberculosis continues to rank among the world's most serious problems despite unparalleled biomedical achievements of

effective prophylaxis and chemotherapy (Kochi, 1994; World Health Organization, 1999). Patient compliance with treatment is commonly poor, and non-completion of a course can lead to relapse, possibly with drug-resistant bacteria (Walley, Khan, Newell, and Khan, 2001). Tuberculosis is increasingly considered a global threat due in part to the resurgence of multi-drug resistant tuberculosis (Nachegea and Chaisson, 2003; Raviglione, Snider, and Kochi, 1995). Several factors are responsible for high incidence and prevalence rates of *Mycobacterium tuberculosis* in underdeveloped and developed countries such as cultural determined beliefs about the knowledge of tuberculosis, failure to adhere to treatment (Rubel and Garro, 1992), prolonged transportation time to treatment and care facilities, the gender of the patient, low levels of patient information and poor quality of communication between patients and health care workers (Comolet, Rakotomalala, and Rajoarioa, 1998), substance abuse, emotional disturbance, homelessness, lack of transportation, dissatisfaction with clinic scheduling, forgetfulness, mental retardation, lack of family or social support, migrant status, illiteracy, unemployment, and low income (Sumartojo, 1993).

Research on chronic conditions such as hypertension or diabetes has shown that patients from diverse populations often have complex mixes of medically accurate and inaccurate beliefs (Cohen, Tripp-Reimer, Smith, Sorofman, and Lively, 1994; MMWR, 1990). Gaps in Vietnamese refugees' tuberculosis beliefs were documented (Carey, Oxtoby, Nguyen, Morgan, and Jeffery, 1997) in New York. These gaps were consistent with those from focus groups conducted with Vietnamese refugees in a recent study (Gibson, Caballero, Vu-Ng, and Carey, 1996). Beliefs in different types of tuberculosis as well as their risk factors were documented in the Philippines (Liefoghe, Micheal, Habib, Moran, and De Munync, 1997), Kenya (Liefoghe, Baliddawa, Kipruto, Vermeire, and De Munync, 1995) and Pakistan (Nichter, 1994). In a recent South African study (Edginton, Sekatane, and Goldstein, 2002), participants believed that tuberculosis is the result of breaking cultural rules that demand abstinence from sex after the death of a family member and after a woman has a spontaneous abortion. Study participants also believed that only traditional healers could treat tuberculosis. Furthermore, this cohort of tuberculosis patients and community members also believed that western type tuberculosis can spread from sufferers as a result of environmental pollution, smoking, or alcohol excesses. Distorted tuberculosis beliefs as documented in this study does not only cause delays in presentation to hospitals and clinics, it could contribute to adherence failure as well. A number of factors were cited by participants in this study conducted in a rural district in South Africa that influenced adherence to tuberculosis treatment. These included the stigma associated to tuberculosis, the belief that there should be abstinence from sex while on treatment, long waits, difficulties in accessing health services, unacceptable workers attitudes, and other distorted health beliefs.

The Health Belief model (HBM) is the oldest and most widely used model to explain health behavior. Hochbaum (1958) and Rosenstock (1960, 1966) first used the Health Belief Model to explain the impact of beliefs and attitudes concerning protective health behaviors such as obtaining immunization and chest x-rays for tuberculosis. It has since been further developed (Becker, 1974; Rosenstock, 1990), and applied to several health-related areas including health promotion behaviors. In the last decade the

HBM has been applied to study a variety of health behaviors, attitudes and beliefs under different situations and populations (Conner and Norman, 1994; Norman, 1995; Poss, 1998; Poss, 1999; Poss, 2000). The HBM has been used to study Breast-Self Examination performance with Hispanic and non-Hispanic Caucasian women (Borrayo, 1998; Borrayo, Guarnaccia, and Mahoney, 2001; Hammond, 1994; Rajaram and Rashidi, 1998). It has also been used to study the social influence in home safety practices of mothers with pre-school children (Russell and Champion, 1996). According to researchers Becker, Maiman, Kirscht, and Drachman (as cited in Hammond, 1994) and as documented by Barnhoon and Adriaanse (1992) the HBM hypothesizes that patients in treatment are likely to adhere to their medical regimen under a very specific set of conditions enumerated below. 1) Patients must have some minimal health knowledge and motivation towards staying healthy. 2) Patients must perceive themselves as vulnerable to the disease and they must also believe that their illness is clearly a serious medical and health problem. 3) Patients must also be convinced that current treatment is effective, i.e., that it is indeed possible to obtain control over the disease at an acceptable cost and that the cost does not outweigh the benefits. 4) The presence of an internal or external stimulus, sometimes commonly referred to as “cue to action,” the trigger the health behavior of patients such as taking medication. 5) Self-efficacy belief was added to the Health Belief Model framework in light of the work of Bandura (1977) and other researchers. For instance, “patients must have high levels of self efficacy to perform routine tasks such as taking tuberculosis medication daily for the entire duration of treatment. 6) Lastly, a sixth construct was added to the model by Hershey, Morton, Davis, and Reichgott (as cited by Hammond, 1994)- perception of personal influence over events (locus of control). To avoid confusion with a similar but different from Rotter’s (1966) Locus of Control Concept, confidence has been used to represent the individual’s perception of control (Hammond, 1994). As Kirscht (1988) wrote in his analysis of the HBM, it is “complex and variable in its history, yet surprisingly robust and useful (Kirscht, 1988 pp. 12).” Poss (2001) described the model as being useful in explaining health behaviors: it is applicable to a variety of settings, it is parsimonious, and because it is a middle-range theory, it can generate hypotheses for testing.

The first five constructs of the HBM are used here to investigate congruent and incongruent beliefs held by smear- and culture positive/negative patients for *Mycobacterium tuberculosis* in Manhattan’s Central Harlem District in New York City. Prior to conducting this investigation no detailed study has been conducting among African -Americans using the five-health belief model constructs. With this problem in focus, the specific aims of this cross-sectional study (Montero and León, 2002) are:

- To describe and identify congruent/incongruent belief gaps via detailed item-analysis of five (perceived susceptibility, perceived severity or seriousness, perceived barriers, perceived benefits, and self-efficacy) health belief constructs about tuberculosis infection or disease among the target population (both suspects for tuberculosis and active tuberculosis cases).
- To identify demographic congruent/incongruent belief gaps via construct analysis of five (perceived susceptibility, perceived severity or seriousness, perceived barriers, perceived benefits, and self-efficacy) health belief constructs about

tuberculosis infection or disease among one segment (n=110) that are active tuberculosis cases.

The structure of this article follows the procedures suggested by Bobenrieth (2002) for research papers on health science.

Method

Subjects and Sampling Frame

A total of 230 patients who were (suspects for tuberculosis and smear- or culture-positive for tuberculosis) admitted and attending Harlem Hospital Center participated in the study. Most of the 230 patients displayed one or more clinical signs and symptoms prior to hospitalization at this public hospital located in the Borough of Manhattan of New York City. Due to linguistic, psychiatric, and educational barriers the data from only 202 respondents were analyzed for this study.

Demographic Profile. Out of the eighty-nine suspected patients: 92.1% (n=82) were English-speaking African –American, 5.6 % (n=5) were English-speaking Latinos and the remainder was white. As far as educational attainment, 65.1% (n=58) had 9th to 12th grade education, while 17% (n=15 and n=16) had less 9th grade and some college education. Of the 110 tuberculosis cases, a total of ninety-three percent (N=103) identified themselves as African-Americans, while 5.5% (n=6) identified themselves as English-speaking Latinos and 0.9% as other. With regards to educational attainment for tuberculosis cases, 61.8% (n=68) had 9th to 12th grade education, 23.6% (n=26) had more than 12th grade education, and 14.5% had less than 9th grade education. The age for both groups ranges from 19 to 73 years. Additional demographic data for this sample has been reported elsewhere in the literature (see, Ikoli Ilongo, Teachers College, Columbia University, 1994 Unpublished Doctoral Dissertation Report).

Instrument

The Preliminary Item Statements of this instrument were adapted from the Venereal Disease Education Health Belief Model Scale (Simon and Das, 1984), with a five-point Likert response options ranging from “Strongly Agree” to “Strongly Disagree,” including an option for “No Response”. Self-efficacy was included to the health belief in light of the work of Becker (1974) and Bandura (1977). The self-efficacy items were placed on five-point Likert scale, with response options ranging from “Extremely Confident” to perform a medical/non-medical related task to “Not at all Confident.” The researcher selected the VDEHBMS by Simon and Das (1984) due to its content appropriateness and excellent reliability coefficients on all four construct areas. Alpha reliability of .89 was reported for susceptibility, .66 for severity, .91 for barriers, and .86 for benefits. Substituting tuberculosis in place of “venereal disease” modified item statements for this research. Other item statements were borrowed and in some cases modified from previous research conducted by Jenkins (1966), Mata (1985), and Westaway (1989, 1990). Finally, beliefs statement items were adapted from patient literature and training manuals from the Centers for Disease Control and Prevention and NYC, Department of

Health, Bureau of Tuberculosis control. Each of the 51 Belief items was placed in one of five content areas: 1) Perceived susceptibility (*10 items*), 2) perceived severity or seriousness (*7 items*), 3) perceived barriers (*14 items*), 4) perceived benefits (*12 items*), and 5) self-efficacy (*7 items*). The instrument surpasses the reliability required for formative research and the reliability results have been reported elsewhere (see, Ikoli Ilongo, Teachers College, Columbia University, 1994 Unpublished Doctoral Dissertation Report).

Results

Belief gaps among suspects and active educated tuberculosis cases

To describe and identify congruent/incongruent belief gaps a detailed item-analysis was conducted on the five health belief constructs in the areas of perceived susceptibility (*10 items*), 2) perceived severity or seriousness (*7 items*), 3) perceived barriers (*14 items*), 4) perceived benefits (*12 items*), and 5) self-efficacy (*7 items*) about tuberculosis infection or disease among suspects and active educated tuberculosis cases. Table 1 thru Table 4 shows data arranged in three columns. Column one lists “strongly agreed” responses for both groups while column two lists “agreed” responses for both groups. Column three lists the combined totals for columns one and two respectively. The categories were combined since responses from both groups have the same meaning and the difference is a matter of degree. Depending on the wording of the statement the response “strongly agreed” or “agreed” may constitute an incongruent belief and the reverse may also hold true. No responses were analyzed as disagreements to the statements made.

Perceived susceptibility tuberculosis belief items

The target population (82-91%) held the most congruent tuberculosis beliefs in four items under tuberculosis susceptibility belief domain namely: “tuberculosis is not a condition you are born with;” “if infected with the tuberculosis germ, living in the street will increase my chances of breaking down with tuberculosis;” “if infected with the tuberculosis germ, addiction to drugs or alcohol increases my chances of breaking down with tuberculosis;” and “if infected with the tuberculosis germ, having malnutrition will increase my chances of breaking down with tuberculosis” (See Table 1 for details). High percentages of incongruent beliefs were also held by five items in the perceived susceptibility construct domain namely: “I take a bath every day with soap and water, so I am not likely to catch tuberculosis;” “If I had tuberculosis and got treated, I could not catch it or get again;” “I am too young to have tuberculosis;” “If infected with the tuberculosis germ, having AIDS will increase my chances of breaking down with tuberculosis; and “I am very healthy, so my body can fight off tuberculosis germ”. Also, over 75% incorrectly associated good religious teachings with reduced likelihood of catching tuberculosis. Collapsed data on suspected and tuberculosis cases for perceived susceptibility beliefs items are reported on Table 1.

TABLE 1. Gaps in Susceptibility Beliefs of Suspects and Active tuberculosis Cases.

PERCEIVED SUSCEPTIBILITY ITEMS	<i>Number of tuberculosis Cases/Suspects</i>		<i>Number of tuberculosis Cases/Suspects</i>		<i>Number of tuberculosis Cases/Suspects</i>	
	<i>Strongly Agree</i>		<i>Agree</i>		<i>Combined</i>	
	<i>n</i>	<i>%</i>	<i>n</i>	<i>%</i>	<i>n</i>	<i>%</i>
I am too young to have tuberculosis	56	27.7	95	47.0	151	74.7
I am very healthy, so my body can fight off tuberculosis germ	32	15.8	102	50.5	134	66.3
Tuberculosis is a condition you are born with	66	32.7	118	58.4	184	91.1
I take a bath every day with soap and water, so I am not likely to catch tuberculosis	55	27.2	106	52.5	161	79.7
My religious teachings have been very good, so I am not likely to catch tuberculosis	65	32.2	100	49.5	165	81.7
If I had tuberculosis and got treated, I could not catch it or get again.	56	27.7	100	49.5	156	77.2
If infected with the tuberculosis germ, having AIDS will increase my chances of breaking down with tuberculosis	51	25.2	86	42.6	137	67.8
If infected with the tuberculosis germ, living in the street will increase my chances of breaking down with tuberculosis	64	31.7	110	54.5	174	86.2
If infected with the tuberculosis germ, malnutrition increases my chances of breaking down with tuberculosis	57	28.2	110	54.5	167	82.7

Perceived severity tuberculosis belief items

Congruent perceived severity tuberculosis health beliefs were held in numerous items (see Table 2). The most congruent perceived severity tuberculosis health beliefs were held in the following items: almost the entire target population considered tuberculosis to be a serious disease because it may damage a lung in the long run. Close to two-fifths of the suspected and tuberculosis cases incongruently believed that: "If they contracted tuberculosis, it would seriously prevent them from working and slightly three out every four subjects sampled believed that tuberculosis is more serious than most other diseases and that based on their opinion, which in this case happens to be very congruent that tuberculosis is a serious disease because it may eventually result in removal of their lung" (see Table 2). Ambivalent beliefs were held in two items namely: "Contracting tuberculosis will disturb my peace of mind and if I contract tuberculosis, it will seriously disturb my family relations". In the first belief statement, slightly above 50% of the sampled population agreed with this statement. For the second statement over 60% of the population disagreed. Collapsed data on suspects and tuberculosis cases for perceived severity beliefs items are reported on Table 2.

TABLE 2. Gaps among Suspects and active tuberculosis Cases on Severity Beliefs.

PERCEIVED SEVERITY ITEMS	Number of tuberculosis Cases/Suspects		Number of tuberculosis Cases/Suspects		Number of tuberculosis Cases/Suspects	
	Strongly Agree n	%	Agree N	%	Combined n	%
I think tuberculosis is a serious disease because it may damage a lung in the long run	83	41.1	112	55.4	195	96.5
Tuberculosis is more serious than most other diseases	44	21.8	110	54.5	154	75.3
In my opinion tuberculosis is a serious disease because it may eventually result to removal of your lung	48	23.8	113	54.5	161	76.3
I do not believe tuberculosis is a serious disease because it is not going to kill me	59	29.2	106	52.5	165	81.7

Contracting tuberculosis will disturb me peace of mind	17 8.4	87 43.1	94 51.5
If I contract tuberculosis, it will seriously disturb my family relations	14 6.9	63 31.2	77 38.1
If I contract tuberculosis, it would seriously prevent me from working	51 25.2	116 57.4	167 82.6

Perceived barrier tuberculosis belief items

The sampled population registered numerous incongruent tuberculosis barrier beliefs; this was clearly demonstrated by several items in this section of the beliefs battery (see Table 3). Specifically, when the researcher read the following statements such as: “you don’t like to go for tuberculosis medication refill and check up because you don’t know the location of the Clinic”; “you don’t like to go for tuberculosis medication refill and check up because the tuberculosis Clinic/Hospital hours are not convenient for you”; “you don’t like to go for tuberculosis medication refill and check up because it is hard to schedule an appointment” and two other statements shown on Table 3, slightly over 87% strongly agreed/agreed with all five items; hence, strongly indicating significant barriers with respect to the five items mentioned. Three more additional items also indicated barriers similar to the previous five items mentioned earlier (see Table 3). When the following statements enumerated below were read aloud to the target population namely: “you don’t like to go for tuberculosis medication refill and check up because you have to wait too long in the Clinic”; “you don’t go for medication refills and check up because you are afraid other people in the Hospital or Clinic will know that you have tuberculosis”; and “you are too embarrassed to go for tuberculosis medication refill and follow-up”. The percentages documented in all three items shown on Table 3 (over three out of every four patients) clearly demonstrated major incongruent barrier belief gaps held by this inpatient and outpatient population. Finally, based on the findings a disproportionate percent of the population will encounter difficulties getting their tuberculosis medication refilled and check up because it is hard to get time off from work to go to the Hospital or Clinic. The same level of disproportionate percentage (over 70% or higher) may not see their doctor because they are afraid their doctor might find something wrong with their lung or body. Collapsed data on suspected and tuberculosis cases for perceived barrier beliefs items are reported in Table 3.

TABLE 3. Gaps in Barriers Beliefs held by Suspects and active tuberculosis Cases.

PERCEIVED BARRIER ITEMS	<i>Number of tuberculosis Cases/Suspects</i>		<i>Number of tuberculosis Cases/Suspects</i>		<i>Number of tuberculosis Cases/Suspects</i>	
	<i>Strongly Agree</i> n	%	<i>Agree</i> n	%	<i>Combined</i> n	%
I don't go for medication refills and check up because I am afraid other people in the Hospital or Clinic will know that I have tuberculosis	51	25.2	116	57.4	167	82.6
I am too embarrassed to go for tuberculosis medication refill and follow-up	52	25.7	120	59.4	172	85.1
I don't like to go for tuberculosis medication refill and check up because I'm afraid the doctor might not treat me with respect	53	26.2	124	61.4	178	87.6
I don't like to go for tuberculosis medication refill and check up because the nurse might not treat me with respect	45	22.3	130	64.4	175	86.7
I am unable to afford the cost of periodic tuberculosis follow up visits	35	17.3	106	52.5	141	69.8
I don't like to go for tuberculosis medication refill and check up because it is hard to get time off from to go to the Hospital or Clinic	37	18.3	116	57.4	153	75.7
You are afraid that the doctor might find something wrong with your lung or body	37	18.3	116	57.4	153	75.7

I am hesitant to go to the tuberculosis because the hospital/clinic worker may tell other about my visit	40 19.8	137 67.8	177 87.6
I don't like to go for tuberculosis medication refill and check up because you have to wait too long in the Clinic	43 21.3	125 61.9	168 83.2

Perceived benefit tuberculosis belief items

The target population (92-99%) held congruent tuberculosis beliefs in nine items under tuberculosis benefit belief domain (see Table 4). However, slightly incongruent tuberculosis benefit beliefs were registered when at least two benefit statements were read aloud to the sampled population: “tuberculosis medicines are effective in preventing illness that may result from the effects of tuberculosis” and “special diets are effective in preventing illness that may result from the effects of tuberculosis”. Collapsed data on suspects and tuberculosis cases for perceived benefit beliefs items are reported in Table 4.

TABLE 4. Gaps in Benefit Beliefs held by Suspects and active tuberculosis Cases.

PERCEIVED BENEFITS ITEMS	Number of tuberculosis Cases/Suspects		Number of tuberculosis Cases/Suspects		Number of tuberculosis Cases/Suspects	
	Strongly Agree		Agree		Combined	
	n	%	n	%	n	%
Tuberculosis medicines are effective in preventing illness that may result from the effects of tuberculosis	37	18.3	136	67.3	173	85.6
Special diets are effective in preventing illness that may result from the effects of tuberculosis	15	7.4	133	65.8	148	73.4
It is important to take tuberculosis medication regularly if you have the disease	63	31.2	133	65.8	193	96.2

It is important that you eat a balanced diet	60 29.7	137 67.8	197 97.5
It is important that you get regular check-up	61 30.2	137 67.8	198 98.0
It is important that you get enough sleep	54 26.7	143 70.8	197 97.5
It is important that you avoid smoking cigarettes	55 27.2	131 64.9	186 92.1
It is important that you avoid drinking alcohol	58 28.7	130 64.4	188 93.1
It is important that you avoid taking illegal drugs; and	65 32.2	123 60.9	188 93.1
Opening windows and doors in the house is important	41 20.3	134 66.3	178 86.6
Seeking immediate advice if I suspect that I have tuberculosis is important	54 26.7	139 68.9	193 95.5
Encouraging any body that I suspect of having tuberculosis to seek immediate medical help is important	66 32.7	134 66.3	200 99.0

Perceived self-efficacy tuberculosis belief items

When the entire population was systematically queried about their levels of confidence to talk to their doctor about caring for their tuberculosis and with regards to following their doctor's prescription, the total of percentages that were extremely confident; that were very confident; that were only moderately confident; that were slightly confident and that were not at all confident at performing the aforementioned tasks were extremely similar for suspected tuberculosis cases as well as true tuberculosis cases. As seen in Table 5 similar results were documented with two additional items namely: keeping appointments for medication refills and check up without a reminder from their doctor or health care worker and getting follow-up tuberculosis care if it is necessary. Much lower levels of self-efficacy were registered for the last two items on the self-efficacy battery namely: "Complete treatment without assistance from your doctor or health care

provider” and to “Complete six months of treatment on two or more medications without assistance from doctor or health care provider”. A little over one out of three subjects were confident about performing the first and second task mentioned, while one out five were not at all confident at performing both tasks. All data on suspected cases, true cases, and both groups for perceived barriers belief items are reported in Table 5.

TABLE 5. Comparison of Tuberculosis Cases and Suspects on Self-efficacy Beliefs.

PERCEIVED SELF-EFFICACY ITEMS	Level of Confidence	<i>Tuberculosis Suspects</i>		<i>Tuberculosis Cases</i>		<i>Combined</i>	
		<i>n</i>	<i>%</i>	<i>N</i>	<i>%</i>	<i>n</i>	<i>%</i>
Talk with your doctor about caring for your tuberculosis condition	Extremely Confident	48	53.9%	58	51.8%	106	52.7%
	Very Confident	25	28.1%	38	33.9%	63	31.3%
	Moderately Confident	7	7.9%	8	7.1%	15	7.5%
	Slightly Confident	2	2.2%	5	4.5%	7	3.5%
	No Confidence	7	7.9%	3	2.7%	10	5.0%
Follow your doctor's prescription	Extremely Confident	47	52.8%	53	47.3%	100	49.8%
	Very Confident	27	30.3%	43	38.4%	70	34.8%
	Moderately Confident	7	7.9%	8	7.1%	15	7.5%
	Slightly Confident	6	6.7%	5	4.5%	11	5.5%
	No Confidence	2	2.3%	3	2.7%	5	2.5%
Keep your appointments for medication refills and check up without a reminder from your doctor or health care worker	Extremely Confident	48	53.3%	51	45.5%	99	49.0%
	Very Confident	27	30.0%	41	36.6%	68	33.7%
	Moderately Confident	7	7.8%	11	9.8%	18	8.9%
	Slightly Confident	5	5.6%	6	5.4%	11	5.4%
	No Confidence	3	3.3%	3	2.7%	6	3.0%

Keep your appointments for medication refills and check up without a remainder from your doctor or health care worker	Extremely Confident	48/53.3%	51/45.5%	99/49.0%
	Very Confident	27/30.0%	41/36.6%	68/33.7%
	Moderately Confident	7/7.8%	11/9.8%	18/8.9%
	Slightly Confident	5/5.6%	6/5.4%	11/5.4%
	No Confidence	3/3.3%	3/2.7%	6/3.0%
Get follow-up tuberculosis care if it is necessary	Extremely Confident	49/54.4%	50/44.6%	99/49.0%
	Very Confident	29/32.2%	45/40.2%	74/36.6%
	Moderately Confident	6/6.7%	9/8.0%	15/7.4%
	Slightly Confident	2/2.2%	7/6.3%	9/4.5%
	No Confidence	4/4.4%	1/ .9%	5/2.5%
Complete treatment without assistance from your doctor or health care provider	Extremely Confident	32/35.6%	38/33.9%	70/34.7%
	Very Confident	23/25.6%	30/26.8%	53/26.2%
	Moderately Confident	4/4.4%	11/9.8%	15/7.4%
	Slightly Confident	8/8.9%	15/13.4%	23/11.4%
	No Confidence	23/25.6%	18/16.1%	41/20.3%
Complete six months of treatment on two or more medications without assistance from doctor or health care provider	Extremely Confident	34/37.8%	35/31.3%	69/34.2%
	Very Confident	16/17.8%	31/27.7%	47/23.3%
	Moderately Confident	9/10.0%	10/8.9%	19/9.4%
	Slightly Confident	7/7.8%	12/10.7%	19/9.4%
	No Confidence	24/26.7%	24/21.4%	48/23.8%

Demographic belief gaps of active tuberculosis cases

To identify demographic congruent tuberculosis belief gaps, a detailed construct analysis was conducted on the same five health beliefs constructs about tuberculosis infection or disease among one segment (n=110) that are active tuberculosis cases.

Religion

An examination of within group differences based on religious affiliation (Catholic and Non-Catholic) for one dependent sample that had active tuberculosis was statistically significant. Specifically, Multivariate Hotelling t and some Univariate F indicated statistical significance in between group differences at .05 levels based on religious beliefs. The mean score for overall beliefs was higher for non-Catholics compared to Catholics (3.0613 vs. 2.8615), meaning non-Catholics held more congruent beliefs compared to Catholics. The reported value for overall beliefs was $HF=2.76447$, $df=5.00$, $p=.022$. Complementary t-test on overall beliefs based on dichotomous religious affiliation at $HF=1.262$, $df=107$, $p=.009$. Univariate F statistics for beliefs was not significant for all (perceived susceptibility, perceived barriers, perceived benefits, and self-efficacy) beliefs constructs except (perceived severity or seriousness $t=2.69794$, $df=5.00$, $p<.003$, and efficacy $t=5.23725$, $df=1.07$, $p<.024$).

Housing status

An examination of within group differences based on housing (stable versus unstable) for one dependent sample that had active tuberculosis was also statistically significant. Multivariate Hotelling t and some Univariate F indicated statistical significance in between group differences at .05 level based on housing (stable vs. unstable) for overall beliefs ($t=2.697994$, $df=5.00$, $p<.025$) for tuberculosis cases only. Univariate F statistics for beliefs (tuberculosis cases only) was not significant for all (perceived susceptibility, perceived severity or seriousness, perceived barriers, and self-efficacy) beliefs constructs except perceived benefits to treatment ($F=9.75085$ $df=1.108$, $p<.002$). Those who resided in unstable housing had higher overall mean score, meaning they held more congruent overall held beliefs. They also held higher mean score in the benefit construct area, meaning that they regarded tuberculosis treatment as been more beneficial as opposed to those who lived in stable living arrangements. All other demographic characteristics such as gender, income and age were not statistically significant.

Discussion

Active and tuberculosis Suspects congruent and incongruent item analysis beliefs gaps

The results of this study point to several incongruent (inaccurate) beliefs held by the target population. These incongruent health belief gaps could negatively impact efforts to control this infectious disease. Documented below are a series of implications that are recommended for future hospital and ambulatory-based tuberculosis educational programs whose ultimate goals and objectives are to educate tuberculosis patients or suspected patients and may be reduce tuberculosis non-adherence failures. First, the results of this study clearly demonstrate that African- Americans who are suspects for tuberculosis and tuberculosis cases have distorted beliefs on components of at least four out of five health belief model constructs measured which may be associated with non-adherence behavior. Future research with African-American populations should investigate the totality of their belief systems and other predisposing, enabling, and reinforcing

factors and their impact on non-adherence. Only after such comprehensive investigations are conducted can appropriate and scientifically sound tuberculosis health education and promotion interventions be systematically executed at all levels of care and treatment. Second, under the construct perceived susceptibility, only 18.3%-32.2% held congruent beliefs in six out of 10 (60%) of the perceived susceptibility items. These percentages clearly demonstrated that patients at high risk for tuberculosis and full-blown tuberculosis cases consider themselves not to be at risk for contracting this infectious disease. Failure to consider themselves at risk for contracting tuberculosis may decrease their likelihood of seeking prompt care and treatment. Clearly, no response by patients will constitute an inappropriate action that may increase the spread of this infectious disease in the community. Third, the results demonstrate that close to one out of every 10 members of the target population incongruently believed that tuberculosis is acquired genetically. Health educators should clearly inform their patients that the tuberculosis germ is caused by a bacterium. Promoting the later incongruent belief (that tuberculosis is a genetic disease) could lead to complacency and non-adherence failures if subjects believed strongly that genetically acquired conditions such as tuberculosis are beyond their control. Fourth, almost every other subject interviewed said "contracting tuberculosis will disturb their peace of mind" and over one out three subjects thought, "Contracting tuberculosis would adversely affect their family relationships." While patients have to be worried about contracting and spreading the disease to other members of their communities: these fears should not persist after they have received treatment and they are no longer infectious. Patients and their family members should be correctly educated about how the disease is transmitted and about other aspects of the disease. Family members must be encouraged to provide patients with the necessary psychosocial support while they continue with their treatment after they have been removed from isolation. Health care professionals should redirect their educational programs and efforts on educating the community on the duration of treatment, degree of infectivity, transmission, prevention, and causes so as to reduce the levels of tuberculosis phobia and stigma associated with the disease. Repeated educational interventions may be necessary to change patients' beliefs about tuberculosis infection and disease. In general patients' tuberculosis beliefs tend to be deeply ingrained and unresponsive to change. This problem is especially true when it is heavily compounded with social rejection and stigma (Edginton *et al.*, 2002; Jenkins, 1966; Long, Johansson, Diwan, and Winkvist, 1999a, 1999b, in press; Mata, 1985; Westaway, 1989). A curriculum that reduces the stigma of contracting tuberculosis should be established for patients, family members, and significant others. This curriculum component of the program could be incorporated in all support group sessions during treatment of the patient during home visits, at the clinic, and while the patient is attending the Directly Observed Therapy (DOT) program. Reduction of phobia and stigma may lead to better family relationships, better adherence and improved tuberculosis disease control within the community at large. Fifth, over 80% grossly overestimated the severity of tuberculosis by stating that contracting tuberculosis will seriously prevent them from working. Tuberculosis health educators should inform the at risk population that with appropriate treatment tuberculosis patients could return to work after three weeks with little or no physical problems. Repeated and

systemic educational interventions may be necessary to reduce the levels of tuberculosis severity among this population. Sixth, a disproportionate number (195/96.5%) congruently perceived “Tuberculosis to be a serious disease because it may damage a lung in the long run if left untreated”. However, a much lower number and percentage (154/75.3%) considered “other diseases to be more serious than tuberculosis”. Like the previous item a similar percentage and number (161/76.3) considered “Tuberculosis to be a serious disease because it may lead to removal of your lung if left untreated”, while a little over 80% did not believe tuberculosis to be serious enough to cause death. Less aggressive tuberculosis health education is called for the last two items since the view held by over 75% of the target population is accurate. Furthermore, tuberculosis health educators should emphasize patient vulnerability and severity of tuberculosis during patient intervention or educational sessions in all settings. This may encourage patients to seek tuberculosis care early if they are infected or have full-blown tuberculosis disease. Seventh, Close to seventy percent perceived cost of periodic tuberculosis follow-up visits to be problematic (see Table 3). Furthermore, a little over three out of four research subjects (75.7%) said “they will not to go for tuberculosis medication refill and check up because it is hard to get time off from work to go to the Hospital or Clinic”, the same percentage also said that “they were afraid that the doctor might find something wrong with their lung or bodies (see Table 3)”. Factors that contribute to promoting the aforementioned barriers should be carefully investigated and corrective measures implemented. Reducing barriers will not only encourage participation; moreover, it will also reduce non-adherence failures in the clinics and treatment facilities throughout the health care system. Health care and treatment administrators should do more in reducing these barriers faced by patients when they interface with health care and treatment employees. Eighth, only close to three out of five subjects (123 out of 202) were extremely confident or very confident that they could complete treatment without assistance from their doctor or health care provider (see Table 5 for details). It appears that a number of patients had low levels of self-efficacy (see Table 5), which may contribute to some extent to poor adherence to the treatment protocol (Jaramillo, 1999). Administrators should seriously consider targeting low efficacious patients via a modified DOT therapy and educational program with appropriate incentives to reduce non-adherence failure rate and the spread of multi-drug resistant tuberculosis. Ninth, there was a strong consensus on almost all the items on the perceived benefits of tuberculosis scale—with 10 out 11 items (90%) on the benefit scale registering congruent (accurate) beliefs among 85% of the sample. Health educators need not worry about this area since insignificant tuberculosis beliefs gaps are documented.

Gaps in tuberculosis health beliefs in the nine areas mentioned play an important role in the patients’ ability to follow and adhere to a treatment protocol, care protocol, or undertake appropriate preventive steps. Gaps in tuberculosis health beliefs in the nine areas mentioned in conjunction with: poor distribution of clinical services; difficulties the sick encounter in gaining access to prevention, treatment, and various health care services; glaring social failures; increased incidence and prevalence of HIV infection and AIDS; negative social and cultural attitude towards the disease; lack of awareness of the significance of the symptoms; non-adherence to tuberculosis preventive and

treatment therapy; and incongruent and distorted health, social, and cultural beliefs or different combination of the eight factors may be contributing to non-adherence failure in minority communities throughout the United States. For example, some of these factors probably explain why researchers (Brudney and Dobkins, 1992) found that at New York's same Harlem Hospital Center where this study was conducted, only 11% completed treatment once discharged from the hospital and a staggering 89% discontinued their pills—with 27% becoming sick again within a year. Gaps in tuberculosis cultural and causative beliefs have been known to impact tuberculosis adherence behavior. Barnhoon and Adriaanse (1992) found that witchcraft was associated with non-adherence. De Villiers (1991) felt that for tuberculosis patients witchcraft was an important factor that predisposes people to tuberculosis while (Nicher, 1994) taught that overwork was a risk factor for pneumonia, an illness thought to weaken the lung, predisposing people to tuberculosis. Steen and Mazonde (1999) showed interesting findings in their study in Botswana with respect to causative beliefs. Specifically, they found that heavy work, dust, and smoking from other tuberculosis patients were correlated with tuberculosis non-adherence behavior. Peltzer, Onya, Seoka, Tladi, and Malerma (2002) in addition to the three factors mentioned also found that heredity also plays a role on non-adherence failures in South Africa's Limpopo Province. Heredity was listed as a compliance correlate in a community based study conducted in the Phillipines (Nicher, 1994). A small percentage of our sample also taught tuberculosis was genetically acquired. Furthermore, heredity and hard work were routinely mentioned as causative factors for tuberculosis in Vietnam (Liam, Lin, Wong, and Tang 1999). Nitcher (1994) found that cigarette smoking was associated with Filipino's tuberculosis cases. Due to the fact that causative and cultural beliefs also play a pivotal role in adherence success, it is important that future tuberculosis belief studies with African-American populations should investigate the totality of their belief systems and other predisposing, enabling, and reinforcing factors and their impact on non-adherence failures. Again to reiterate, only after such comprehensive investigations are conducted can appropriate and scientifically sound tuberculosis health education and promotion interventions be systematically executed at all levels of care and treatment.

Clearly, if congruent and distorted beliefs do impact adherence and preventive steps taken, then strengthening the Health Department's tuberculosis education curriculum as it relates to impacting beliefs becomes important. If beliefs can be changed, and non-adherence medication failures decrease, then this could lead to massive reductions in incidence, morbidity, and mortality rates from tuberculosis—highlighting the importance of curriculum reform in the areas of tuberculosis beliefs by the New York City Health Department and other County, City, and State Health Departments that routinely utilize the Center for Disease Control and Prevention Tuberculosis guidelines. On the overall, structured and repeated health education is called for to eliminate or reduce these incongruent beliefs gaps in this and similar target populations in the United States of America. Approximately 25% of the population in our sample was drawn from Harlem's DOT Clinic; a tuberculosis outpatient treatment program that been shown to be successful through many observation studies in South Africa (Wilkinson, 1994), China (China Tuberculosis Control Program, 1996), Bangladesh (Chowdhury, Chowdhury, Islam, Islam,

and Vaughan, 1997; Chowdhury, 1999), and elsewhere (World Health Organization, 1999). The DOT program provides an opportunity for community health workers, nurses, doctors, and other members of the health care and treatment team to educate and reeducate these patients about documented tuberculosis belief gaps found in this study. Furthermore, a highly tailored program that seals the documented health belief gaps could reduce the magnitude of stigma attached to the disease which is a common problem documented among tuberculosis cases in most countries (Barhoorn and Adriaanse, 1992; Edginton *et al.*, 2002; Liefoghe *et al.*, 1995; Walley *et al.*, 2001). It may be necessary to conduct repeated tuberculosis education intervention in association with de-stigmatization program in order to seal belief gaps experienced by this and similar target populations.

Demographic results of active tuberculosis Cases congruent and incongruent beliefs gaps

Catholics, in having the most incongruent beliefs, might be thought of as posing the greatest challenge to health educators and other health care and treatment professionals determined to impact beliefs. The patient's interpretation of symptoms, decision on when and from whom to seek help, and their response to the medical regimen conforms to their explanatory model of what is wrong (Chrisman and Kleinman, 1993; Hunt, Browner, and Jordan, 1990). If Catholicism contributes to incongruent beliefs, then tuberculosis educators may need to further explore via research the nature of this process and how it may impact compliance with treatment and preventive measures. Failure to explore further the dynamics of religious belief gaps held by this population may negatively impact life style, tuberculosis compliance, and other determinants of tuberculosis health behavior. The results indicate that those who resided in unstable housing had higher overall mean score, meaning they held more congruent overall beliefs. They also held higher mean score in the benefit construct area, meaning they regarded tuberculosis treatment as being more beneficial as opposed to those who lived in stable living arrangements. It is possible that repeated and aggressive exposure to tuberculosis health education in homeless shelter and other health care and treatment facilities did contribute to them finding tuberculosis treatment to be more beneficial. Again, more demographic and item analysis research on gender, marital status, income and age may be necessary to clarify these findings. Further exploration of the dynamics of housing arrangements could help reveal some tuberculosis belief gaps held by this and similar target population, this in turn could have a favorable impact on life style, tuberculosis adherence, and various determinants of health. The subjects studied comprised a convenience non-randomized sample, which might make the results difficult to generalize to other groups of suspected and active tuberculosis cases. However, the sample was representative of the African-American population who had tuberculosis in New York City. Randomization of the sample could have unnecessarily prolonged the duration of the study without necessarily enhancing or improving the quality of the data or the results. The research target population was disproportionately African-American and English speaking Latinos, thus eliminating Spanish dominant Latinos at risk for tuberculosis. To remedy this situation, future research should translate the current instrument

into Spanish and recruit bilingual interviewers to replicate the study with Spanish-speaking Latinos. All the respondents in the entire interview were self-reporting and it was not always possible to verify some of the responses. However, some of the demographic information in particular were verified via the patient's medical chart through the entire study period.

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