Sharing medicines:

metaphoric & metonymic associations of pharmaceuticals, Dominican Republic

A summary of research conducted for a Project Module in the DL Public Health MSc Course at the London School of Hygiene and Tropical Medicine

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Abstract

- **Background ~** People share medicines, and the consequences may include incomplete treatment and possible adverse events in the recipients. Interventions to change medicine sharing behaviour may be more effective if based on the meanings and non-medicinal uses of medicines that are important to people. Better understanding of these meanings and uses could contribute to the design of more effective interventions to decrease medicine sharing.
- **Methods ~** Free pile sort and ranking activities were used to define relationships among selected medicines and a list of other things that could be shared. A ranking activity looked at the relative contributions of efficacy, safety and provenance in people's assessment of an antibiotic. Semantic differential scales were used to explore the concept of local or foreign provenance.
- **Results ~** Participants (n=31) grouped "medicines" together in all pile sort activities; yet, medicines were interpolated amongst other items and not rated differently ($p=0.54$) on "shareability". Compared to other items, more variability of opinion existed as to whether medicines should be shared. Efficacy and safety were significant in people's evaluation of an antibiotic (both $P<0.0001$, effect sizes of 0.84 and 0.49, respectively). "Foreign" was rated more positively than "domestic" in the semantic differential scales, but had no impact on the antibiotic ranks.
- **Conclusions ~** Study participants sorted commercial medicines as a distinct group of things. They saw commercial medicines as shareable, though there was a range of opinion on their shareability. Creating new metaphoric associations for this pre-existing medicine group could decrease inappropriate medicine sharing.

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INTRODUCTION

Medicines are "universally popular" (1, p 97) and people share them (2-12). Generally speaking, sharing medicines is seen as a problem with documented complications (2-5, 7-10, 13, 14). A commonly suggested solution is better patient education within a health belief model of human behaviour (3, 5, 6, 10, 12, 14). However, this approach may be too simplistic as people make decisions about medicines for any number of different reasons (15-17).

Understanding the reasons underlying people's decisions is essential to designing effective health promotion interventions (1, 18, 19). In the case of medicines, insight into medicine sharing behaviour – the how and why and when of medicine sharing – may inform efforts to develop effective interventions to avoid the problems encountered when medicines are shared.

This project approaches the sharing of medicines from a somewhat different perspective than most previous studies. Past investigations of this topic have generally catalogued the types of medicines that are shared and the characteristics of the people who share them; in contrast, this project proposes to examine some perceptions of the medicines that might relate to their being shared.

This study uses qualitative methods to examine how some medicines relate to other objects that could be shared between families, friends, and neighbours. The project is hypothesis generating rather than hypothesis testing (20). The aim of this project is to assess the position of commercial pharmaceuticals related to their candidacy for sharing behaviour against the background of their metaphoric and metonymic associations in the south eastern Dominican Republic.

The specific objectives are:

1. To describe the metaphoric associations of commercially-produced medicines in relation to other objects that could be shared.
2. To describe the metaphoric associations of commercially-produced medicines in relation to other objects within the local *materia medica*.
3. To describe attitudes in response to concepts related to provenance.
4. To describe the relative candidacies of pharmaceuticals for giving and receiving activity.

BACKGROUND

Background: Primates, biological need and "indifferent" thinking

This project is about people sharing medicines. Some anthropologists find insight into human sharing behaviours within primate phylogeny.

Primates share, predominantly in social situations (21, 22). In particular, primates share food in ways that may reinforce power structures within the living group and provide for the weaker members (21-23).

A "functional" anthropological viewpoint (also called "adaptive")(24, p 53) might maintain that all human behaviour and beliefs arise from biological need – the same biological need that motivates other primate behaviour. In contrast, Lévi-Strauss argues that people are not "completely subservient to the need of not starving," and are motivated "to understand the world around them, its nature and their society" (25, p 16). Humans are capable of "indifferent" thought and of activity that is not predicated on survival (25). In other words, humans' pursuits do not necessarily have a biological imperative.

A different three part conception of anthropological understanding is described by Harris (26). Within the context of food, he divides anthropological theory into the "materialist", the "idealist", and the "meaning" categories. The materialist approach is similar to the functional viewpoint described above and looks to the material constraints of existence for explanations of human cultural practices. The idealist approach favours the examination of human thought structure to explain behaviour and is relatively unconcerned with the material aspects beyond what someone might think about them. Lévi-Strauss would be in this idealist category. The meaning approach looks for explanations primarily in the images, symbolism, and allegorical implications of human cultural practices.

All the varied approaches have their adherents. The approaches might all best be viewed as heuristic devices – more complementary than competitive. Regardless of which explanatory approach is taken, the best developed human cultural manifestations (such as customs surrounding eating) may occur where the biological and psycho-social interests overlap (23, 26) – where the material, thought, and meaning converge.

For example, humans have developed elaborate food sharing "systems" adapted to different settings and societal structures using different innovations (23). Conventions and forms for eating make use of the biological need for nutrition in order to serve other social interactions and purposes (23). Built around the biological need to take nutrition, the interactions accompanying a shared meal help to define "what it is to be human" (26, p 8).

As stated in the Introduction, medicines "are universally popular" (1, p 97). Explanations for their popularity include their effectiveness, subversion of the power of the biomedical system, personal empowerment and choice, and their symbolic value (1).

However, a component of medicines' popularity may be even more rudimentary and related more directly to biological need. Just as life implies the biological necessity for nutrition, some have argued that there is an innate will to be healthy. "Health" may be a survival determinant analogous to the more widely recognized needs for food and successful reproduction. In fact, "supporting injured group members" appears among a list of "frequently encountered examples of cooperative behaviours in nature" (27, p 3). Furthermore, health seeking behaviour through the knowledge and medicinal use of plants by non-human primates (zoopharmacognosy) is supported by observations of the apparent use of selected plants to combat and cure disease by chimpanzees and other non-human primates (28).

Barth (29, p 7) wrote of humans: "If a man may and should will to live, then obviously he may and should also will to be healthy and therefore to be in possession of this strength too." For humans, the will to be healthy relates to personal integrity and autonomy – the ability to be human and act human (30).

Medicines, when perceived as a means to health, may look every bit as important as the next meal. Indeed, people may continue consuming medicine when they cannot eat, or even forego food to take medicine. The opportunity cost of buying a medicine may be that food cannot be purchased, resulting in malnutrition (31). "In all epochs and everywhere, sickness and healing are primal human concerns" (32, p 1). Medicines are an integral part of those concerns.

Both food and medicines may be seen as fulfilling a biological human need. Humans have created different customs for consuming food related to rank (who sits at the head of the table, who carves the roast, and who distributes the food, for example), relationship (determining with whom we dine and in what circumstances, the order of courses during a meal, and others), and accoutrements (salad forks, soup spoons, wine glasses, chop sticks, and dining rooms, for example), with the foods often having traversed physical as well as social and cultural networks (23). Similar to the relationship of food to eating, medicines fulfil a primary role in making or keeping people healthy within a set of associated social conventions and cultural systems, also traveling beyond their origins in the process.

Medicines sit within a multiple component human health system that includes at least three sectors: the professional, folk, and popular sectors (33, 34). The various sectors may also demonstrate customs related to rank (physician, nurse, shaman, herbalist), relationship (patterns of resort for care and access to healers), and accoutrements (scalpels, syringes, herbal preparations, and those gowns that never seem to close all the way in the back, for example). While the three sector conceptualization of the medical system is correct as far as it goes, it is incomplete (33, 34). Not only are there more than three sectors, the boundaries among them may be blurred (34), and elements may even be interdependent. A sociologist discussing the historical development of biomedicine in America makes this point when he writes about the interchange and borrowing of materials, models, and methods between professional and lay medicine: "So while professional and lay medicine often regarded each other with hostility and contempt, they bore one another a considerable though little acknowledged debt" (35, p 47).

Medicines move within this complicated nexus of biomedical technology, spiritual philosophies and faith, herbalism and "alternative" medical options, marketplace forces, and beliefs held at a societal or cultural level – traversing the areas of material, thought, and meaning (1, 15, 16). Medicines seem to move among these networked elements as easily as people do (and perhaps more comfortably).

A major focus of medical anthropology books is the consideration of health systems (32, 34, 36-38). Medicines are often positioned as a secondary component of such systems. An alternative viewpoint would be to see the universal popularity of medicines as the stimulus for

the development of these health systems to produce, manage, and apply medicines. Though it is admittedly a "chicken or the egg" proposition, it is likely that medicine preceded any organized health systems. The development of modern biomedical authority and the health system in the USA can be linked to the efforts to boost the respect for medicines through testing and therapeutic trail (35). Furthermore, if medicines are not readily available, people do not visit health systems (16). Rather than a secondary component, medicines may be foundational for health systems and a primary provocateur of their development.

Within the realm of human sharing behaviour, medicines (like food) sit at one of the intersections of "the constantly changing interplay between the social person and biological organism" (23, p 303), helping to explain their popularity across social, cultural, and geographical distances.

Background: Thinginess

For this project, the important underlying assumption about the worth and power of "these 'medicines' is that the capacity to elicit transformation lies within the substance or thing" (1, p 89). Furthermore, it is the materiality of medicines, their "thinginess", as Whyte and colleagues say (15, p 13), that allows medicines to circulate and to acquire the metaphoric and metonymic associations with which this project is concerned (16).

This project further assumes that medicines enter into a social gifting and reciprocity system as described by Mauss (39). The assumed model of exchange for this project is a complementary and symmetrical dyadic contract between people of equal socioeconomic status in which things are exchanged to reinforce and maintain social relationships (40).

When a neighbour provides a popular herbal remedy from a garden, the medicine originates within a social relationship with all its shared *emic* perspectives still intact (41). In contrast, commercial pharmaceuticals are likely shared in social relationships after separation from their biomedical origins (perhaps having out-distanced the biomedical "cultural" knowledge for their use) (41).

Accordingly, commercial pharmaceuticals can be positioned both as a part of and apart from biomedicine. Commercial pharmaceuticals escape from the biomedical context through a variety of sanctioned activities (such as distribution to users with medically-defined problems) and unsanctioned routes (such as drug diversion) (42). Following separation from the biomedical system, pharmaceuticals may enter and exit a commodity function (15, 16, 43). Once medicines are removed from their original context, altered meanings may be imputed to them and the medicines may be utilized for different purposes than the original intent (15-17, 34).

Medicines may assume symbolic meaning (1, 16). Sharing medicine can be a sign of relationship or relatedness. Administering a medicine can be a sign of caring or of the fulfilment of a parental obligation, publicly demonstrating that the parent is loving and responsible (1).

Health care workers visiting the Dominican Republic on short-term medical teams have represented the medicines they distribute as symbols of their caring, largesse, liberality, or faith (in the case of religiously motivated groups) (candidate's observation). Local Dominican health care workers have understood these medicines as symbols of the visitors' wealth, their naivety when the medicines are inappropriate to the prevalent illnesses, or their disrespect when the medicines are obviously cast-offs (such as expired pharmaceuticals or excess physician samples) (candidate's observation). The possibilities for symbolic meaning are diverse and broad.

The symbolism and other imputed meanings may be classified as associations that can be divided into those that are metaphors (expressions of similarities) and those that are metonyms (perceptions of contiguity) (15, p. 43, 16). As an example of a similarity/dissimilarity association within the Ayurvedic explanatory models, a metaphoric association occurs when a red-coloured capsule is seen as "hot" and thus a good choice to restore balance when treating dissimilar "cold" illnesses such as a wet cough or upper respiratory infection (1). Metonymic associations may occur related to the provenance of a medicine; for example, foreign or exotic treatments may have a particular appeal (15). These associations and imputed meanings will influence the understanding and uses of medicines (1), and how they might enter into social gifting and reciprocity systems (16, 39, 44).

Reports indicate that the sharing of prescribed pharmaceuticals occurs among people in a variety of situations and locations (2-12). People share medicines distributed by short-term medical mission teams visiting the Dominican Republic at rates that are generally higher than in those reports (45); the medicine's directly identifiable foreign provenance could be a factor (15, 46).

Medication sharing can result in multiple problems, ranging from mild gastrointestinal upset to unintentional foetal exposure to drugs (2-5, 7-10, 13, 14). Proposed solutions generally suggest better patient education within a health belief model of human behaviour (3, 5, 6, 10, 12, 14), based on an information deficit framework and the premise that a rational person will make the "right" decision if she or he simply understands the situation (19); this model also tends to rely on the authority of the professional biomedical system for success (34).

However, treatment adherence theory recognizes that it is not always as simple or straightforward as the health belief model assumes (1, 47); people make decisions about medicines for any number of different reasons (15-17). A deterministic health belief model may be insufficient as it does not recognize that patients have "different ideas and, in particular, different interests" (17, p. 165), and perhaps a general reluctance to take medicines at all (15, 48). When people choose not to follow the advice of health care providers, the reason "is rarely one of lack of knowledge" (47, p 61).

Furthermore, the biomedical model does not easily integrate patients' beliefs, even though health care providers recognize that patients hold various beliefs that are important when they make decisions (49). A rational scientific model does not even adequately explain the behaviour

by health professionals who prescribe medicines (50-53). Health professionals, like their patients, also hold beliefs that may cause them to resist rational concepts and behavioural changes (54).

Background: The anthropology of medicines

The anthropology of medicines can contribute to public health by exploring health seeking and medicine taking behaviours, clarifying the various meanings of medicine, contributing to more informed approaches to public health, and promoting the recognition of the diverse understandings of medicine use, among others (1, p 97). Related to medicine sharing, a better delineation of the metaphoric and metonymic associations could help to define the candidacy of pharmaceuticals as commodities and gifts, as well as the contexts in which transfers might occur (44, 55, 56). Understanding health care from the patients' perspectives – how they view medicines and place them within the other "things" in their lives – could be useful in bio-psychosocial models for planning effective health promotion interventions (18, 19).

This project has some characteristics of both "anthropology *of* medicine" and "anthropology *in* medicine" (theoretical and applied anthropology, respectively) (57, p 31). Because this project considers medicines as shareable objects, its viewpoint is different than the strict biomedical view of medicines. This perspective implies that the project falls under the category of theoretical medical anthropology (where it is probably best positioned) that aims to better understand the functioning of health systems related to human behaviour and cultural understandings (57). However, insights from the project results could find themselves within an applied medical anthropology scenario and serving the goals of biomedicine as related to the medically-defined problem of medicine sharing.

METHODS

Methods: Research Strategies

Participants

The sampling frame included people 18 years of age and older from the general population living in the Province of San Pedro de Macorís, Dominican Republic. The plan was to enrol at least 30 individuals. The sample size of at least 30 subjects was the minimum required to generate reliable results from the semantic differential scales (58).

A convenience sample was used because the majority of participants were expected to be women (probably mothers) who have full and unpredictable schedules and the time of data collection was several weeks prior to a national general election. Disruption of public transportation, general strikes, and other public demonstrations were anticipated (and occurred). More restricted designs (such as a randomized design based on demographics) would have been

problematic. A convenience sample should not unduly affect the results in an hypothesis generating project that describes general concepts rather than making comparisons. The final sample may also have some characteristics of a "snowball sample" as some participants referred others. Inclusion and exclusion criteria included:

a. Inclusion
   - ✓ Age ≥ 18 years.
   - ✓ Dominican.
   - ✓ Able to recognize items from pictures and written descriptions on the cards to be used for the sorting and ranking exercises.

b. Exclusion
   - ✓ Unable or unwilling to provide informed consent.
   - ✓ Inability to understand or complete the exercises.
   - ✓ First or second generation Haitian (or other) immigrant.
   - ✓ Health care professionals.
   - ✓ Family and household members of people who had previously completed the study activities.

Immigrants were excluded as they may not reflect the Dominican cultural understandings.

Data Collection

Data collection was by individual interviews (about 30 minutes in length). After completing the informed consent process, participants' were asked to provide demographic information (sex, age, marital status), self-reported health conditions or medical diagnoses, socio-economic status (educational level and housing information), whether the subject was a health professional or herbalist, and whether the participant had ever shared medicines with anyone.

Participants were then asked to complete three pile sort exercises, a ranking exercise, and a set of semantic differential scales as described below. After activities, brief conversations occurred with participants (for instance, concerning the rationale behind their pile sort groupings).

For the free pile sort of 44 items that could be shared, participants were given a set of 44 randomized cards that were printed on cardstock and trimmed to a 2.3 inch square with names and photos of medicines and other household items that could be shared (Appendix A). The 44 items were chosen from among items identified during a previous free listing exercise. Richer associative networks may be generated using only the name of the item because the photo may act as a visual clue (stressing form over function) (59). However, a medicine's visual appearance contributes to its associations (15, 16) and may be important for categorization. Participants were asked to group the cards into piles. For this and all pile sorts, the number of groups must have

been at least two (all cards could not be grouped together) and less than the total number of cards (at least one association had to emerge). The groups of cards were collected and the associations among items in each group recorded in a separate association matrix for each participant.

For the pile sort constrained to four categories of "shareability", participants were asked to sort the same 44 items. The constraint was to group the items along a four-category, horizontal, analogue scale (Appendix E) based on their candidacy for sharing. This activity generated groups for non-metric multidimensional scaling analysis and ordinal data for each item corresponding to the shareability category in which it had been placed (from 0 for "inappropriate to share" to 3 for "very appropriate to share").

For the free pile sort of 33 items from the local *materia medica*, participants were given a set of 33 randomized cards (Appendix B) with photos and names of pharmaceuticals, over-the-counter medicines, and *remedios caseros* (home remedies) related to five health conditions (headache, hypertension, intestinal parasites, anemia, and a chest cold or "tight breathing") as well as several "unclassified" items. The home remedies were chosen from among those listed during a past free listing exercise. Participants sorted the cards into piles as previously described, and the results were recorded.

Participants were asked to rank eight descriptions of an antibiotic based on their "shareability". The antibiotic descriptions differed by variables of provenance (domestic or foreign: *fabricado en la República Dominicana* or *fabricado en los Estados Unidos*), effectiveness of the medicine (good effectiveness or questionable effectiveness: *eficaz muy bien* or *eficaz dudoso*), and safety (no side-effects or uncertain side effects: *efectos secundarios: ninguno* or *efectos secundarios: inciertos*) in a factorial design with 2^3 combinations for a total of eight descriptions (Appendix D). Participants ranked the descriptions by arranging them on a ladder from 1 to 8 based upon their evaluation of "best" to "worst" (Appendix D). The rank orders of the medicines were recorded.

Participants rated eight different concepts on six 7-point semantic differential scales (Appendix C) (59). Results were recorded.

Semantic differential scales hold their validity well across age groups, socio-economic levels, political orientations, cultures, and languages, among other groupings (58, 60-62). Scales that measure pure factors are the most reliable (58, 60); the universal factors of "evaluation" (E), "potency" (P), and "activity" (A) are well suited to rating concepts using relevant pairs of descriptive antonyms. "Evaluation" often includes some value judgement such as whether something is good or bad. "Potency" generally includes judgements such as whether something is strong or weak. "Activity" rates things on scales such as active or passive.

The concepts to be rated were: *remedios caseros; farmaceuticos comerciales; operativo médico de un grupo extranjero; policlínica de salud pública; fabricado en los EEUU; fabricado en la República Dominicana; libertad;* and *trueno* (home remedies; commercial

pharmaceuticals; medical consultations with foreigners; Dominican public health primary care clinic; made in the USA; made in the Dominican Republic; liberty; and thunder, respectively).

Liberty and thunder were included as internal control concepts. The concept "liberty" has high cross-cultural and intra-cultural (i.e., stereotypical) homogeneity with a consistent "E+ P+ A+" factor profile; "thunder" shows much more cross-cultural and intra-cultural heterogeneity, while maintaining a consistent "E- P+ A+" factor profile (61, Table 5(b), p 28 and Table 7, p 32).

Scales for this project were constructed by taking descriptive words for the key factors of "evaluation", "potency", and "activity" that appear commonly across cultures (60) and that have high factor ratings in Mexican Spanish (61, Table 4, p 25), by confirming accepted Spanish language synonym and antonym pairs (63), and by choosing the most relevant and least ambiguous terms with the advice of Dominicans (Table 1).

The semantic differential scale booklet (see Appendix C) began with an example using a concept with known characteristics (luna, *"moon")* (61). The order of presentation of the concepts does not affect the results (58). However, to increase sensitivity and differentiation (58), the scales were ordered differently on each page and sometimes had their poles reversed using a randomly generated scheme.

Table 1. Descriptors for the three key factors in the semantic differential scales.

Descriptor pairs are oriented with negative pole on the left and positive on the right.

			Factors			
		Evaluation		**Potency**		**Activity**
Spanish	Eva1*	Malo-Bueno	Pot1	Menor – Mayor	Act1	Pasivo – Activo
	Eva2	Desagradable-Agradable	Pot2	Débil – Fuerte	Act2	Lento – Rápido
English		[Bad-Good]		[Lesser – Greater]		[Passive – Active]
		[Disagreeable-Agreeable]		[Weak – Strong]		[Slow – Rapid]

*Short-hand identifications of descriptor pairs.

Statistics

Statistics were both descriptive and analytical (64, 65). Descriptive statistics included counts, means, medians, ranges, etc. Analysis of continuous data was by t-test for two groups and one-way analysis of variance for multiple groups. Ordinal data were compared for two groups by Wilcoxon rank sum test and for multiple groups by the Kruskal-Wallis test. Categorical data were analysed using contingency table methods. Because "symbolism is created

in the ethnographic encounter" (15, p 42), *post hoc* analysis used Cronbach's alpha to investigate congruency of the responses to the semantic differential scales.

The data from the semantic differential scales (objective 3) for each concept were combined to produce a set of three factor scores for each item ("evaluation", "potency" and "activity" scores), which were further combined to generate concept profiles. Reliable D scores could be calculated (58).

The ordinal data from the factorial ranking exercise (objective 4) were examined with a non-parametric Kruskal-Wallis test to determine if the results were non-random. Variances, covariances, omega squared (ω^2), and effect size were calculated by ANOVA (treating the ordinal data as though they were interval data) using the model:

$$y = \beta_0 + \beta_1 x_1 + \beta_2 x_2 + \beta_3 x_3 + \beta_{12} x_1 x_2 + \beta_{13} x_1 x_3 + \beta_{23} x_2 x_3 + \beta_{123} x_1 x_2 x_3$$

A commercial statistics program (Stata/IC 10, StataCorp, College Station, Texas, USA) was used for the standard statistical analyses.

In addition, results from the pile sort data were combined for each objective using a spread sheet program (Excel 2010, Microsoft, Redmond, Washington, USA) as described by Bernard (59) to generate a summary matrix for each pile sort objective (objectives 1, 2 and 4) showing the percentage of sorts in which two items were associated. Non-metric multidimensional scaling analysis was applied to the summary matrices using a public domain anthropology analytical program (Anthropac 4.983, Analytic Technologies, Natick, Massachusetts, USA).

Statistical results with P values less than 0.05 were considered significant. Overall Type I error was controlled to a level of 0.05 for multiple pair wise comparisons.

Methods: Limitations of methods selected

While the best understandings might come from a thick description of the ways in which people view, understand, and use medicines (15), the time constraints of the project module did not permit an in-depth participant observer ethnographic approach. Time constraints also eliminated most of the methods used in household studies of medicine usage as reviewed recently by Bertoldi and co-workers (66).

Time was also insufficient to use qualitative individual or group interviewing techniques with open-ended enquiries and emergence of themes and concepts (67). Survey techniques offer a structured data gathering process and can streamline analysis. However, a *de novo* instrument would have required careful construction and validation (68), a process requiring more time, separate ethics approval, and a validation sample of 100 or more individuals. Use of existing, validated surveys is always a possibility. However, translating a questionnaire for use in Spanish essentially requires a re-validation process in the new language (69); also, those in standard modern Spanish may perform in unexpected ways in the Caribbean region (as demonstrated

while re-validating a World Health Organization Spanish-language questionnaire here) (70). In addition, no surveys were found that apply well to the question in this proposal.

Likert-type scales are straight forward and lend themselves to computerization. However, despite their apparent simplicity, Likert-type scales have essentially the same considerations as other survey methods, requiring pre-testing and validation with 100-200 individuals followed by careful analysis of each item to construct the final instrument (59).

Consequently, free sort techniques (also called pile sorts), semantic differential scales, and visual analogue-type ranking scales were chosen for this project. The pile sort technique does not depend upon pre-existing concepts or categories. As stated above, semantic differential scales hold their validity well across multiple demographic and language categories (58, 60-62). Ranking exercises generally do not require pre-validation. A limitation is that the techniques chosen for this project may have produced shallower and less comprehensive understandings than some of the other methods listed above.

Using a convenience sample means that the study undoubtedly had unknown (and unknowable) biases. The biases limit the conclusions that can be drawn from the study, but they may not greatly influence the qualitative observations available from the data (20). No clear cause and effect relationships can be intuited from the results. Accordingly, any associations or relationships observed may be considered interesting, but inconclusive. Also, the pile sort results cannot be compared among individuals; the results represent a compendium of opinions – a "group cognition" – and can only be considered as a whole (59, p 313).

The sample is relatively small, diminishing the power of the study. However, as the purpose of the investigation is primarily descriptive, the loss of power is of less concern than it might be in a hypothesis testing study where failure to reject a false null hypothesis would be a concern (a type 2 or β error).

Methods: Ethics review and informed consent

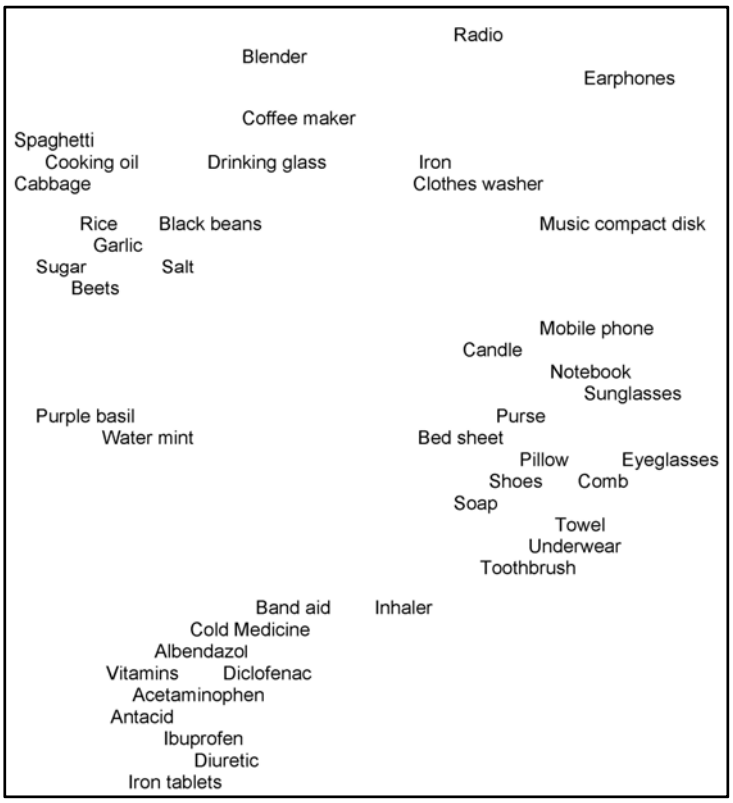
The study, including the written informed consent and documentation process, was approved by the ethical review committee of Clínica Esperanza y Caridad and the LSHTM Combined Risk and Ethics committee prior to any data collection.

This was a minimal risk (71, 72) study in which the major risk to participants was loss of confidentiality. Each participant was assigned a unique study number that identified her or his test materials. All consent and test materials were secured in a safe with limited access. Computerized databases were maintained on a password protected computer with backup on an external disk drive stored in a safe.

RESULTS

During the two weeks from 25 April through 8 May, 2012, thirty-three people were invited to participate in this study; thirty-one (26 women, 5 men) accepted and gave consent. The convenience sample included a mixed population. Ages ranged from 19 to 56 years (mean 37.6, median 38, SD 8.7) and were not different by sex (P=0.58). Subjects lived in urban (n=19) and marginal urban communities (n=12). Eighteen were single, nine were married, and four were in common law marriages. In terms of educational level, one subject had not completed primary, six had completed primary, 12 had completed secondary, and 12 had university studies. Thirteen people had self-described chronic health conditions and were taking medications. Medical professionals and health care workers were excluded from the sample; however, the snowball sampling lead to a string of three people infected with HIV who had received intensive treatment literacy orientation and who were intolerant of medication sharing, an orientation perhaps more representative of the "medical culture" than the popular culture.

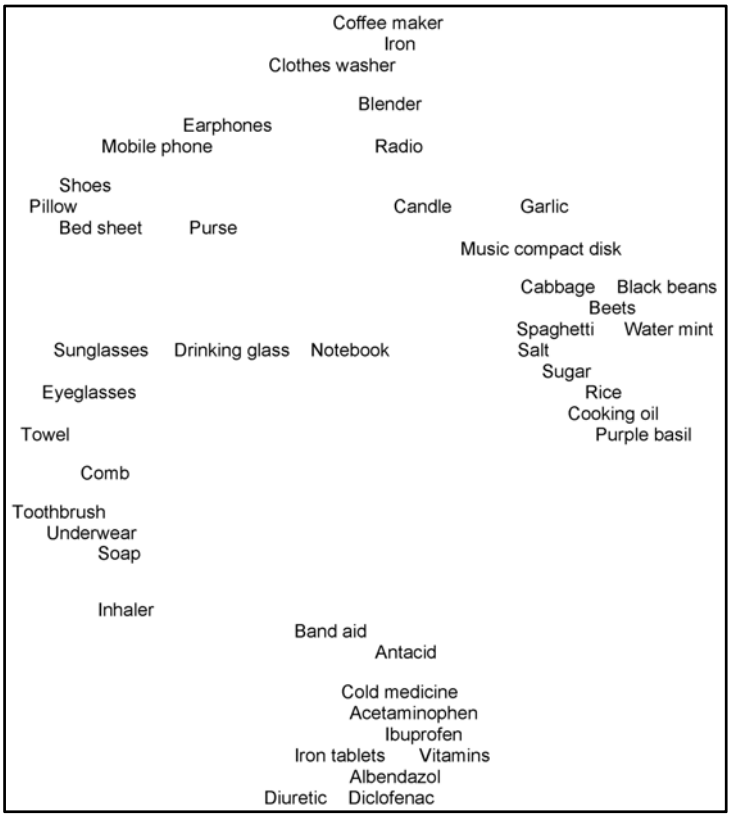
Figure 1. Pile sort association map of 44 objects that could be shared.



Results of the pile sort exercise related to objective 1 ("to describe the metaphoric associations of commercially-produced medicines in relation to other objects that could be shared", n=30 [one participant's results were mistakenly erased]) suggested a tight grouping of "medicines" (near the bottom of Figure 1) with looser groups of what might be called "foods" and "personal items", as well as other scattered items (individual item coordinates in Appendix F). This activity suggested that people think of medicines as separate from other things in their lives, with the closest relationships being to the grouping of personal items.

Groupings from the constrained pile sort activity for objective 4 ("to describe the relative candidacies of pharmaceuticals for giving and receiving activity", n=31) suggested that people maintained the "medicine" and "food" groups when sharing (Figure 2; individual item coordinates in Appendix H). Items from the original "personal

Figure 2. Pile sort association map of 44 objects when constrained to four categories of shareability.



items" group in the first pile sort were more dispersed, though generally continuing to be more closely associated with "medicines" than were the other items.

Data from the four shareability rank categories (from 0 for "inappropriate to share" to 3 for "very appropriate to share") were used to generate a mean shareability rank and SD for each of the 44 items (Table 2). There was no difference between the shareability ranks of the ten commercial pharmaceuticals (indicated by an asterisk in Table 2) and the other 34 items (P=0.54).

One measure of the concordance of the opinion among the participants is the SD of the means of the shareability ranks.

Table 2. Individual "shareability ranks" of 44 items in the constrained pile sort.

Tabulated list of the mean rank (SD) for each item arranged from top to bottom in sequential columns from left to right from the most shareable (highest values) to the least (lowest values).

Black beans 2.64 (0.66)	Salt 2.19 (1.08)	Band aid 1.68 (1.17)	Bed sheet 0.90 (0.98)
Green/water mint 2.55 (0.67)	Diclofenac* 1.90 (1.14)	Iron tablets* 1.68 (1.17)	Mobile phone 0.84 (0.93)
Rice 2.55 (0.72)	Cold medicine* 1.90 (1.25)	Clothes iron 1.61 (1.05)	Sun glasses 0.81 (0.91)
Spaghetti 2.52 (0.81)	Ibuprofen* 1.87 (1.18)	Notebook 1.61 (1.15)	Pillow 0.74 (0.93)
Beets 2.48 (0.77)	Albendazole* 1.84 (1.16)	Blender 1.61 (1.17)	Inhaler* 0.55 (0.89)
Purple basil 2.45 (0.72)	Antacid* 1.81 (1.14)	Clothes washer 1.58 (1.09)	Eye glasses 0.52 (0.72)
Sugar 2.45 (0.77)	Acetaminophen* 1.81 (1.17)	Diuretic* 1.52 (1.12)	Hair comb 0.48 (0.81)
Cabbage 2.45 (0.77)	Candle 1.77 (1.12)	Ear phones 1.29 (1.04)	Soap 0.42 (0.89)
Garlic 2.39 (0.80)	Vitamins* 1.77 (1.15)	Drinking glass 1.13 (1.12)	Towel 0.16 (0.37)
Cooking oil 2.26 (0.82)	Coffee maker 1.71 (1.19)	Shoes 0.97 (1.02)	Underwear 0.065 (0.25)
Music CD 2.19 (0.83)	Radio 1.71 (1.19)	Purse 0.97 (1.11)	Tooth brush 0.0 (0.0)

* Indicates a commercial pharmaceutical. Values could range from 0 to 3, from "not appropriate to share" to "very appropriate to share", respectively. Higher values indicate greater candidacy for sharing activity.

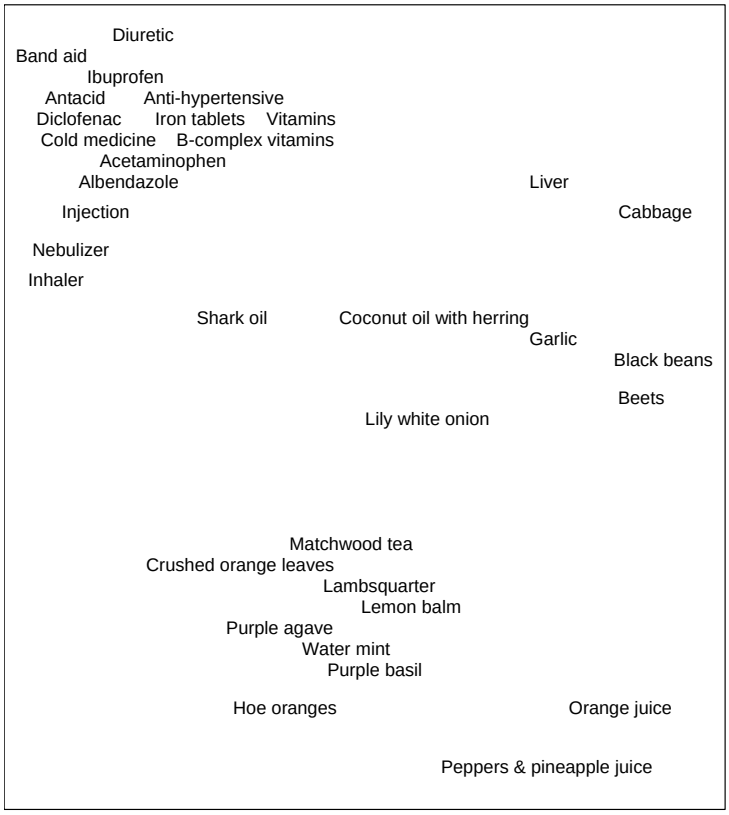
Table 3. Concordance of opinion: shareability of 44 items in the constrained pile sort.

The table lists the SD of the mean "shareabilty ranks" for each item, arranged by the SD, from highest concordance items (lowest SD) to those with more variability of opinion, from top to bottom in sequential columns from left to right.

Tooth brush 0.00	Garlic 0.80	Shoes 1.02	Notebook 1.15
Underwear 0.25	Spaghetti 0.81	Ear phones 1.04	Vitamins* 1.15
Towel 0.37	Hair comb 0.81	Iron 1.05	Albendazole* 1.16
Black beans 0.66	Cooking oil 0.82	Salt 1.08	Band aid 1.17
Water mint 0.68	Music CD 0.83	Clothes washer 1.09	Iron tablets* 1.17
Purple basil 0.72	Soap 0.88	Purse 1.11	Acetaminophen* 1.17
Rice 0.72	Inhaler* 0.90	Candle 1.12	Blender 1.17
Eye glasses 0.72	Sun glasses 0.91	Drinking glass 1.12	Ibuprofen* 1.18
Sugar 0.77	Pillow 0.93	Diuretic* 1.12	Coffee maker 1.19
Cabbage 0.77	Mobile phone 0.93	Diclofenac* 1.14	Radio 1.19
Beets 0.77	Bed sheet 0.98	Antacid* 1.14	Cold medicine* 1.25

* Indicates a commercial pharmaceutical.

Figure 3. Pile sort association map of 33 objects from the local *materia medica*.



The mean shareability ranks of the ten commercial pharmaceuticals generally had larger SD's than the other items (Table 3).

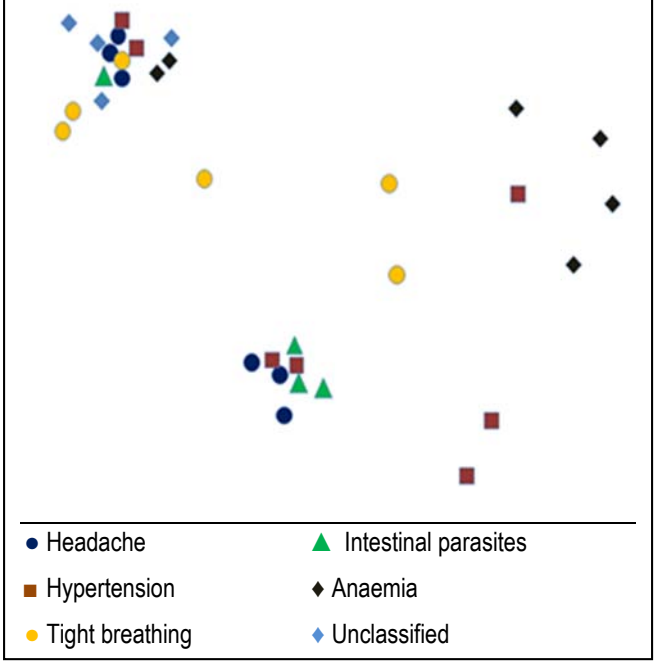
The commercial pharmaceuticals are generally considered shareable (falling in the mid-range of the shareability ranks in Table 2). However, participants had variant opinions as to the medicines' candidacy to be shared (as indicated by the medicines' generally larger SD's in Table 3).

Results of the pile sort exercise related to objective 2 ("to describe the metaphoric associations of commercially-produced medicines in relation to other objects within the local *materia medica*", n=30 [one participant's results were mistakenly erased]) suggested that people place commercial pharmaceuticals together and group them separately from the various home remedies (Figure 3; individual item coordinates in Appendix G).

Table 4. *Materia medica* related to five common illnesses.

Headache	Hypertension	Intestinal Parasites	Anaemia	Tight Breathing	Unclassified
Hot hoe oranges	Lemon balm	Lambsquarter	Liver	Generic liquid cold medicine	Band aid or small adhesive bandage
Hot purple agave	Garlic	Purple basil	Vitamin B complex injection	Coconut oil with herring	Vitamin capsules
Crushed orange leaves	Orange juice	Green/water mint	Black beans	Shark oil	Sal Andrews (patent medicine with antacids)
Acetaminophen	A diuretic	Albendazole	Iron tablets	Oral inhaler	Hypodermic injection
Diclofenac	Hypertension medicine		Cabbage	Pressured nebulizer treatment	
Ibuprofen	Matchwood tea		Beets	Lily white onion	
	Peppers & pineapple juice				

Figure 4. Pile sort association map of local *materia medica* by disease groups.



Overall, people did not seem to sort these things according to their associated health uses as listed in Table 4 (Figure 4). However, participants' spontaneous comments and some individual sorts clearly indicated that consideration of the medicinal uses of the various items contributed to the groups that some individuals formed.

The factor scores from the semantic differential scales related to objective 3 ("to describe attitudes in response to concepts related to provenance") are shown in Table 5 along with the D scores between paired concepts.

In general, the "foreign" concepts ("foreign medical clinic" and "made in the USA") were rated more positively than their local alternatives ("Dominican public health clinic" and "made in the Dominican Republic", respectively). The concepts of "home remedies" and "commercial pharmaceuticals" were rated similarly, without as much difference in their factor scores.

D scores represent the distance between two concepts when their factor scores are plotted as points on a three-dimensional evaluation-potency-activity coordinate axis. "Foreign medical

Table 5. Semantic differential scale factor scores and D scores.

	Factor scores* presented as mean (SD): Evaluation	Potency	Activity	D Scores
Made in the Dominican Republic	1.5 (3.6)	0.81 (2.9)	1.4 (3.1)	3.36
Made in the USA	3.1 (2.7)	3.3 (2.5)	3.0 (2.7)	
Dominican public health clinic	0.10 (4.0)	-1.3 (3.8)	-0.03 (4.2)	6.89
Foreign medical clinic	4.6 (1.8)	3.2 (2.7)	2.6 (3.2)	
Home remedies	1.7 (3.1)	2.4 (3.2)	1.9 (3.3)	0.44
Commercial pharmaceuticals	2.0 (2.8)	2.1 (3.1)	2.0 (3.3)	

*Factor scores are the sum of the two item scores for each factor; factor scores could have a range from -6 to 6.

clinic" and "Dominican public health clinic" had the largest D score indicating a larger difference in overall affective reaction to those concepts; the D score for "made in the USA" and "made in the Dominican Republic" was less. "Home remedies" and "commercial pharmaceuticals" elicited very similar affective responses. In addition, the two local concepts ("Dominican public health clinic" and "made in the Dominican Republic") had a D score of 2.91 and the two foreign concepts ("foreign medical clinic" and "made in the USA") of 1.56.

The results for the control concepts (thunder and liberty) were in agreement with their previously reported profiles (61).

Table 6. Cronbach's alpha values between individual semantic differential scale items.

	Eva2*	Pot1	Pot2	Act1	Act2
Eva 1	**0.79**	0.48	0.49	0.43	0.54
Eva 2		0.34	0.50	0.48	0.49
Pot 1			**0.70**	0.69	0.62
Pot 2				0.74	0.68
Act 1					**0.68**

*Eva = evaluation item; Pot = potency item; Act = activity item (see Table 1).

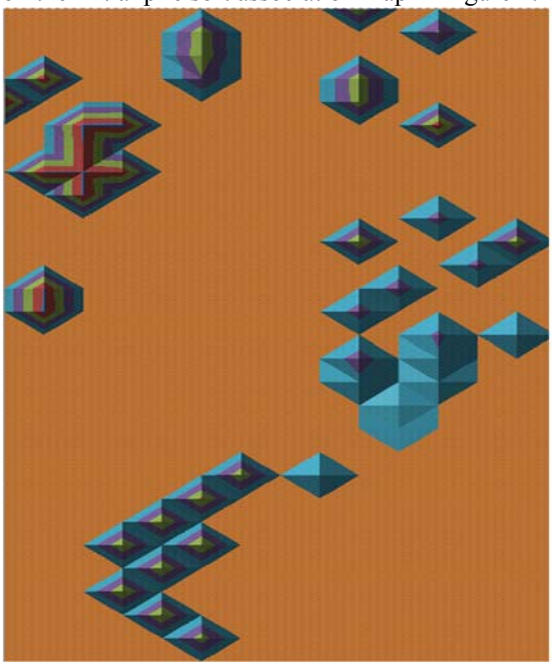
The paired "Evaluation", "Potency", and "Activity" items had Cronbach's alpha values of 0.79, 0.70, and 0.68, respectively. The Cronbach's alpha values are problematic as an absolute estimate of internal consistency (73); however, from a relative standpoint, the paired items for each factor domain had generally higher values than when paired with other items (Table 6), suggesting they were measuring the same factors; some potency and activity factors were closely correlated even though they purportedly measure independent dimensions (58).

Three participants completed the semantic differential scale booklets in an indiscriminate manner (for example, marking all choices in the extreme left or right column on alternating pages) and were different in some ways when compared to other participants (P values of 0.28, 0.005, and 0.012 for E, P, and A scores, respectively). Also, their answers did not conform to the

known profiles for the control concepts. However, their answers were included in the summary in Table 5 as the overall patterns were not affected. In addition, one participant skipped the page for "Dominican public health clinic" and another omitted answering one of the evaluation scales for "commercial pharmaceuticals"; these non-responses were included as missing values.

Results of the antibiotic ranking activity ("to describe attitudes in response to concepts related to provenance"), using binomial variables of provenance, efficacy and safety, showed a non-random pattern (P = 0.0001). Participants showed a preference for better efficacy and safety. Efficacy emerged as the main factor in the ranking of the antibiotics with an effect size of 0.84 ($P < 0.0001$, $\omega^2 = 0.41$); safety had an effect size of 0.49 ($P < 0.0001$, $\omega^2 = 0.20$). A significant interaction occurred between efficacy and safety (effect size 0.094, P = 0.013, $\omega^2 = 0.0087$). Provenance did not significantly affect the rank order (P = 0.17). Two subjects did not complete the antibiotic ranking activity because of an unexpected time constraint and they are not included in these results.

Figure 5. Contour graph of shareability scores of 44 things. This contour graph superimposes the items' shareability scores over each item's position on the initial pile sort association map in Figure 1.



Shareability score ranges

2.4-3 1.8-2.4 1.2-1.8 0.6-1.2 0-0.6

Responses to whether or not participants had previously shared medicines were not informative. All participants had previously shared medicines given the very broad definition of "medicine" in this project. Generally, participants demonstrated a high level of tolerance for prescription medication sharing.

One question that arose from the results was whether there was a relationship between the shareability scores of the items and the groupings that emerged during the initial pile sort activity. Substituting the shareability scores for the names of the items in the first pile sort association map allowed the construction of a contour graph.

Generally speaking, items in the initial pile sort groups tended to have similar shareability scores (Figure 5). Whatever influences resulted in the formation of the groups in the first pile sort were paralleled by choices of where to place the items on the shareability scales in the final activity. Perhaps the suggested categories from the first pile sort ("medicines" at the bottom, "food" along the upper left edge, and "personal items", midway along the right side) are not simply functional taxonomy, but correlate with a sense of ownership or privacy or some other

quality. The personal items might be linked by a sense of intimacy, for example. However, this is purely speculation – the underlying concepts are unknown.

DISCUSSION

This project collected information that could provide insight into how people view medicines and some of the factors that seem important to them.

Among the major results are the following findings. Study participants consistently sorted the commercial medicines into a separate group of things. Commercial medicines were shareable and fell within the middle ranges of shareability among the objects presented to participants in this study. The results further suggest that people have less agreement about the shareability of medicines compared to the other items. When it came to evaluating antibiotics, study participants prioritized efficacy over safety, and provenance did not affect the results. However, the foreign concepts did evoke larger positive affective responses from participants than did the local alternatives on semantic differential scales.

Despite all the numbers in this project report, the results are fundamentally qualitative – representing items in different groups or different orders. As the numbers represent categorical distinctions, they cannot be seen to indicate absolute magnitudes, but only relative relationships.

Most commercial medicines (except psychoactive pharmaceuticals and opiates) are available in the Dominican Republic without a prescription. This environment may be important when considering the results.

The focus in this project was metaphoric associations among the medicines and other objects. This project did not attempt to define metaphoric relationships between medicines and the perceptions or characteristics of diseases – the more commonly recognized realm of metaphoric associations (16). Also, metonymic associations were confined to the concept of provenance – local or foreign, and home remedy or commercially-produced. This project's research activities lay somewhere in the area between the "logistics of meaning" and the "social efficacy" of medicines (15, p 169-70), investigating neither the meanings of medicines nor their specific social uses.

This study has other limitations. It may have measured the wrong determinants of sharing behaviour. It did not directly address determinants such as social factors including norms for sharing behaviour, economic status, or patterns of resort for health care. It did not collect extensive demographic information about participants nor attempt to relate personal characteristics to sharing behaviour. This study did not attempt to evaluate sharing as related to the social distance between the borrower/receiver and the lender/giver. Sharing behaviour varies in different relationships, and social distance may be a primary factor in sharing, economic decisions, and drug commodification (15, 39, 40, 44, 74). Never-the-less, some potentially useful results emerged.

Sorting-out forty-four things that could be shared

The first pile sort indicated that people group medicines apart from the other items. However, when it comes to their candidacy for sharing, the medicines were interpolated amongst other items. These results imply that while people may share the biomedical perspective that medicines are "different" or "special", this perception does not prevent medicines from becoming candidate things for circulation within their social networks. As people consider sharing medicines, they tend to preserve the viewpoint that medicines are a distinct group of things, but there is generally less agreement among people concerning whether medicines should be shared compared to sharing the other items in the sort.

From a health promotion standpoint, these results offer both good and bad news. The tendency for people to already think about medicines as a distinct category is helpful and suggests that interventions to change behaviour might be designed to apply broadly to that category of things. The bad news is that people are apparently quite willing to share items belonging to the medicine group. Yet, there is a lower concordance of group opinion about medicine sharing; to the extent that this lower level of group consensus indicates uncertainty or ambiguity, health promotion interventions may more easily alter opinions and behaviours.

Items in the local *materia medica*

Observations of participants during the second pile sort activity indicated that some people sorted the items from the *materia medica* by their associated disease categories, while others sorted herbal versus commercial medicines, for instance.

The multidimensional analysis of the second pile sort did not reflect categorization by disease. A reason for this may be that knowledge of medicinal uses of herbal medicines is not universal. The *materia medica* items in this sort were generated from a free listing exercise involving multiple people; the final list from which the items were chosen represented a composite knowledge. During this pile sort activity, one individual commented, "I really don't know much about what these herbs can treat", indicating an awareness of herbal therapy, though not an understanding of it. During this pile sort, another person held one of the cards aloft and said, "I don't know what this is for" (not "I don't know what this is"), suggesting that she was using functional categories to sort the cards. Observation of the participants during the pile sort activity (and their descriptions of their groups after the sort) suggested that people would use functional categories if possible – that is, those that knew the uses of the various items tended to group them by function.

Also, the observation in the Methods section – pictures on the cards may stress form over function – may have been a factor in this pile sort. The pictures could be sorted as those showing parts of plants versus obviously manufactured items (pills, boxes, and nebulizers, for example), diminishing the importance of the disease categories.

If functional categories have a higher organizational usefulness for people, this may provide a useful insight into how to best educate patients regarding their medicines. Health promotion strategies providing a fuller explanation of how a medicine works and how it relates to other medicines could take advantage of people's preferred way to think about and categorize medicines.

Unfortunately, the nature of the pile sort activities does not allow an analysis of the shareability scores according to whether or not people approached the *materia medica* activity from a functional standpoint. Therefore, this study does not indicate whether people with a better functional understanding of medicines were more or less prone to share medicines.

Efficacy, safety and provenance in antibiotic ranking

Results of the antibiotic ranking activity indicated that people want their medicines to work, but are also concerned about adverse events and safety. While most participants ranked the antibiotics based primarily on their efficacy, some ranked the antibiotics without side effects as their top four choices. At least two subpopulations may exist: those that prefer that medicines work and those that prefer that they are safe. This observation would be in agreement with past work (1, 48).

Provenance did not emerge as a factor in the antibiotic ranking activity. This is different than might be anticipated from past observations (15, 46). In contrast, foreign concepts were rated differently and more positively in the semantic differential scale activity. One explanation might be that provenance serves as a surrogate for other qualities; since both efficacy and safety profiles were specified for each antibiotic description, perhaps provenance was less useful information for people.

There are additional multiple and complex influences on sharing behaviour beyond the three factors in this activity. Asking people to rate each medicine's shareability separately, for example on a Likert-type scale, tends to produce clustering around the midpoint (the "it all depends" point). By having participants rank all the descriptions of an antibiotic simultaneously, participants could apply whatever sharing environment and scenario they preferred, and still be forced into ranking the antibiotic descriptions relative to one another within whatever situation they envisioned.

Semantic differential scales

In contrast to the antibiotic ranking activity above, the "foreign" concepts ("foreign medical clinic" and "made in the USA") were rated more positively than the local alternatives. However, the examples meant to represent the concepts "foreign" and "local" may have been too specific to purely measure those domains. Spontaneous comments after completion of all the activities indicated that responses for "Dominican public health clinic" and "foreign medical

clinic" might have been reflecting specific personal experiences rather than a response to the underlying concepts of "foreign" or "local". This is perhaps to be expected; Carroll (75, p 114) writes that semantic differentiation is "a way of indexing the individual's *experiences* with the objective referents of those concepts" [Carroll's italics].

Responses on the semantic differential scales did not distinguish between commercial pharmaceuticals and home remedies; participants tended to react to them similarly without a clear affective preference for one or the other. Thus, while commercial medicines sort separately from home remedies, their affective value is not really different. Perhaps this affective equivalency with home remedies is one of the reasons that commercial medicines are so easily considered to be candidates for sharing.

One final observation relates to the health belief model, a model predicated on an understanding of human behaviour as *rational*. However, the three participants with HIV infection clearly believed that medicines should not be shared, and spoke *emotionally* about this belief – one of them going so far as to lecture someone (complete with finger pointing) after completion of all the study activities. "Objects hold emotions," says Michael McGinnes, collections manager, The Smith Museum, Stirling, Scotland (76). Beyond the factual information about medicines and beyond the meanings that medicines may hold for people, there may also be an emotional domain. The people with HIV infection had undergone intensive treatment literacy training based on a biomedical health belief model; this training had somehow engendered an emotional response so that these people talked passionately about the hazards of sharing medicines. The mortality and medication dependency associated with HIV infection may contribute to the emotionality. Never-the-less, an awareness of an apparent "emotion domain" for health promotion activities in general seems prudent.

Concluding remarks

Results of this project suggest several possibilities for health promotion activities addressing medication sharing.

First, the project findings suggest that people think of commercial medicines as a distinct group of things, but the opinions on the candidacy for sharing these things is variable. One could hypothesize that health promotion interventions directed at developing an appropriate cultural consensus on the candidacy of medicines for sharing activities could be effective.

Rather than health-belief-based interventions against sharing particular medicines (directed toward specific patients or patient groups), health promotion interventions designed to arrive at an appropriate population consensus of opinion about the shareability of medicines – an agreed upon cultural paradigm of medicine sharing – might be a more effective approach. Network interventions could be a useful method (77). Information exists on the use of social norms interventions in diverse areas. A few recent examples include the use of social media in youth

alcohol misuse, universal prevention strategies in foetal-alcohol disorders, social marketing in tractor turnover prevention, and theatre for health promotion in nutrition and AIDS (78-82). Results from these and other health promotion interventions might offer theory and methods applicable to medication sharing.

Second, the project findings suggest that specific groups of things in the first pile sort tended to have a similar candidacy for sharing. The group of "personal items", for example, generally had consistently lower shareability scores than the "medicines" group. One could hypothesize that health promotion activities that successfully identify medicines with a group of things having a lower shareability score (such as personal items) may decrease the medicines' candidacy for sharing.

Possible strategies include an overt identification tactic in which medicines are linked to personal items through a suggested metaphoric association: "These medicines are just like your comb or your towel or your toothbrush – things just for you!" Another strategy might be to establish metaphoric associative links through existing or suggested common characteristics of medicines and personal items. Several participants identified the concept behind their group of personal items as "things I keep in the bathroom". Encouraging people to store medicines in the bathroom beside the toothpaste and toothbrush might be one way to establish a metaphoric link, for example. Precedents for this type of created metaphoric association exist and are perhaps best studied in commercial advertising, for example the linking of drug-like pleasure sensations with food advertisements for children (83).

Finally, the attitude of the participants living with HIV/AIDS towards medicine sharing deserves further consideration. Their reactions suggest an emotional behavioural domain that health promotion activities might intentionally target to impact medicine sharing. "Emotion" is listed as one of the identified "success factors" potentially useful in public health campaigns (84). The impact of emotions on message reception and health behavioural change has been investigated, often using the bimodal "appetitive" and "aversive" theoretical framework (85). As an example, evoking negative emotional responses is an effective method for mass media anti-tobacco social marketing campaigns in high-, middle-, and low income countries (86, 87). Emotionally mediated stimuli may result in better attention to and memory of health messages, though the responses may vary depending upon peoples' pre-existing appetitive and aversive tendencies associated with the object or topic of interest in the health promotion communication (88). The success of emotional appeals (as opposed to informational appeals) may also depend upon whether people's attitudes toward the object being addressed are initially more affective or cognitive (89). Medicines prompted positive affective responses in semantic differential scales in this report; the cognitive attitudes are uncertain. Additional information about whether people consider medicines and sharing them from an affective or cognitive standpoint could be important.

When emotions are elicited by a message, the brain activity patterns in humans parallel those observed in non-human primates (90). Apparently, primate phylogeny may be related to the roots of human sharing behaviour as well as to possible interventions.

Medicines are universally popular and people share them. With appropriate interventions that acknowledge how people view and use medicines, a healthier standard of medicine sharing should be possible. This project has contributed to furthering the understanding of medicines from the perspective of those who obtain them, manage them, and sometimes pass them along.

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Abbreviations and Definitions

Abbreviations

AIDS	Acquired immune deficiency syndrome
CD	Audio compact disk
HIV	Human immunodeficiency virus
LSHTM	The London School of Hygiene and Tropical Medicine
SD	Standard deviation
USA	United States of America

Definitions

commercial pharmaceuticals: refers to those drugs (or "medicines", see definition below) that arise from a Western biomedical pathophysiological understanding of health, through a regulated process of evaluation for efficacy and adverse effects, with specific approved indications and precautions, and a controlled distribution system. They may be available either by prescription or over-the-counter.

emic: "emic perspective privileges the viewpoint of the local, the insider. Emic explanations are adequate if they generate statements that are real or meaningful to the people being studied" (91, p 24).

explanatory model: the meaning and utilisation of "explanatory model" differs among anthropologists and even subsets of health professionals (such as between physicians and nurses) (92). For this paper, an explanatory model refers to the synthesis of the concepts

of disease in general, of the causes and treatments of groups of ailments as well as of particular diseases or episodes, and understandings about how all this might fit together into a coherent whole; a single explanatory model may be shared amongst all those involved in the care of a particular episode of illness; or different people may hold different explanatory models, but take advantage of elements from other models which are seen as useful.

functionalism: theory that human behaviours and customs derive from some functional basis (particularly, biological bases such as individual or group survival); this is the definition that applies in this report. However, "functionalism" can also be understood as a theory that society forms a "unitary whole" to which all parts contribute, in which explanations of behaviours and customs are related to their role in the maintenance of this "unitary whole" (34, p 39).

medication: term used interchangeably with "medicine" (see "medicine" below)

medicine: Hahn (32, p 133) identifies four domains of "medicine": 1) the art and science of medicine, the practice of medicine; 2) "concrete, physical medicine", a drug; 3) the treatment of general diseases (as opposed to surgery); and 4) adult medicine or the specialty of internal medicine as distinguished from paediatrics. In this paper, the terms "medicines" and "medicine" are used only to refer to the domain "drugs" as they are understood from a comprehensive definition as "substances (or objects) that, based on their inherent potency, are employed to engender transformation, such as the bodily change from ill-health to health" (1, p 88), which would include commercial pharmaceuticals, folk medicines, over-the-counter medicines, etc.

shareability: the candidacy of a thing to be shared, based on someone's subjective judgement of the appropriateness to share it with or give it to another person; the composite judgement of a group of people on the appropriateness of sharing or gifting a thing between or among people.