

## Social representations of drinking water: subsidies for water quality surveillance programmes

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### ABSTRACT

A qualitative study was developed aimed at understanding the social representations of water consumption by a segment of the population of a small town in Brazil. A total of 19 semi-structured interviews were carried out and subjected to a content analysis addressing opinion on drinking water, characteristics of drinking water and its correlation to health and diseases, criteria for water usage and knowledge on the source and accountability for drinking-water quality. Social representations of drinking water predominantly incorporate the municipal water supply and sanitation provider and its quality. The identification of the municipal water supply provider as alone responsible for maintaining water quality indicated the lack of awareness of any health surveillance programme. For respondents, chlorine was accountable for conferring colour, odour and taste to the water. These physical parameters were reported as the cause for rejecting the water supplied and suggest the need to review the focus of health-educational strategies based on notions of hygiene and water-borne diseases. The study allowed the identification of elements that could contribute to positioning the consumers vs. services relationship on a level playing field, enabling dialogue and exchange of knowledge for the benefit of public health.

**Key words** | health sector, health promotion, interviews, physical parameters, qualitative analysis, water supply

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### ABBREVIATIONS/ACRONYMS

DWQSP Drinking Water Quality Surveillance Programme  
FUNASA National Health Foundation  
PMSA Environmental and Sanitation Action Plan  
WHO World Health Organization  
SAAE Public Water Supply and Sanitation Service Authority

underpinned by excluding and contradictory information and practices when it comes to water management.

This scenario highlights an aspect of inequality that is not characterised by differences among population groups in terms of access to drinking water, but by a relational inequality that privileges suppliers over consumers. This imbalance can break up the core purpose of health protection, as consumers may reject the water being supplied and move over to unregulated sources that are not subject to any systematic control. Thus, merely granting the population with access to water does not suffice; suppliers must also ensure that the water being consumed complies with the World Health Organization (WHO) guidelines for drinking water, that is, water does not represent any significant risk to health over a lifetime of consumption, including

### INTRODUCTION

As a natural monopoly, water supply services constitute an exclusive commodity with very little potential for competition, conforming to a hierarchical relationship that holds suppliers and consuming stakeholders at opposite ends of the scale (water services vs. consumers), and is often

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different sensitivities that may occur between life stages (WHO 2011).

In addition to considering closing the gap between population groups through universal access to services related to sanitation (water supply, sewerage, wastewater treatment, stormwater drainage, solid waste management and excreta management), it is reasonable to assume that the democratisation of these services should seek to balance the relationship between suppliers and consumers. This would mean significant changes to the current dynamics, and such changes require a thorough understanding of the various complex interactions between the parties involved.

The first step in this direction seems to be a better understanding of how drinking water is perceived by its consumers, assuming that the consumption is the element defining or objectifying the bonds (the water delivered to residences through the water supply network) between the two ends of the aforementioned stakeholders' relationship.

Research with focus on the public perception of drinking-water quality (Doria *et al.* 2005; Jones *et al.* 2006; Doria 2010; Silva *et al.* 2010) has analysed data on quality parameters (physical, chemical and microbiological) in conjunction with ideas, images and consumers' opinions with or without approaches that blend elements of the quantitative and qualitative methods. Such research has indicated the importance of accounting for the public perceptions on drinking water to anticipate and minimise potential problems related to water supply when developing projects and policies.

In this context, much importance has been given to consumers' satisfaction and how it drives their choices of water supply (Doria *et al.* 2009; Doria 2010), to the extent that such aspect has been incorporated in recent documents of reference for water quality and health (IWA 2004; WHO 2011). In fact, understanding the public perceptions of water quality may be the key to affording researchers a chance to aggregate scientific knowledge, pertaining to parameters and standards of potability, to common sense.

Although investments have been directed to understand the entrenched aspects of the relationship between drinking water and its consumer, most studies to date have given a descriptive focus on data, disregarding theoretical approaches that could give more of an analytical focus and so assist in deeper comprehension of the data. In this

sense, the Social Representations Theory appeals as a tenet for this study as it can give meaning to the organisation of thoughts by understating human beings 'as one asking questions and seeking answers or thinking, rather than as one processing the information, or behaving' (Moscovici 2009, p. 43).

Social representations are expressed with reference to concepts and values construed upon everyday experiences of social groups and consist of cognitive formations that guide the actions and symbolic production related to them. Social representations are woven by the social experiences of the individuals, which consist of theoretical and abstract elements (information, scientific cognition and common sense), practical elements (daily life actions), social traditions and equally important affective elements. This symbolic organisation, in turn, directs the social practices and their understanding, stirring individuals' everyday living (Moscovici 2009).

The Social Representations Theory has been widely used in research associated with environmental sanitation, for it provides an in-depth understanding of the complex human-environment interactions, from the interpretation of the meanings that such subjects construct in their relationship with the world (Souza & Zioni 2003).

In this respect, understanding the social representations of water seems particularly useful insofar as it can assist in shaping and/or strengthening consumers' trust in the water supply, thus encouraging the consumption of treated water in favour of unknown sources that are not subject to surveillance.

Consequently, these authors have embarked on a qualitative study aimed at understanding the social representations of water consumption by a segment of the population in a small town in the Zona da Mata region of the state of Minas Gerais, Brazil.

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## METHODOLOGY

The methodological approach of this study was chartered with tools of the qualitative research method with focus on understanding an unquantifiable level of reality constituted as 'a universe of meanings, reasons, aspirations, beliefs, values and attitudes' (Minayo *et al.* 2010, p. 21).

This study drew upon research conducted in 2009, in the municipal district of Viçosa, a town located in the subdivision of the Zona da Mata of the state of Minas Gerais, an area with a population of 72,220 inhabitants with approximately 93% residing within its urban perimeter (IBGE 2010). At the time, this town relied on 14 water supply systems, out of which 12 were operated by the local Water and Sanitation Authority supplying water to Viçosa's urban population, plus two remaining systems that were operated by the Federal University of Viçosa, which supplied the university campus.

Between 2008 and 2009, Viçosa took part in a project funded and assisted by the National Health Foundation (FUNASA) to develop its own Environmental and Sanitation Action Plan – PMSA. The requirement for the municipalities to draw their own sanitation plans is provided for by Law No. 11.445/2007, enacted in 2007 to outline the basis for the national policy on water and sanitation. According to Law No. 11.445/2007, the development and implementation of both water and sanitation policy and local PMSAs must comply with certain principles and guidelines, including wide participation and social accountability (Brazil 2007).

In developing a sanitation plan for Viçosa, public workshops were held in its various neighbourhoods and district areas with a call to the local population to discuss issues related to environmental sanitation (water supply, sanitation, urban cleaning, solid waste management and pluvial drainage). During these meetings, groups of peers and delegates were nominated to represent the local communities within the council responsible for mapping out priorities of investment and required interventions.

These delegates elected during public workshops are the subjects of this research. In view of that, the delegates' contact information was noted down and they were later approached with an invitation to take part in this study, and the meetings and visits for interviews were lined up at a date and time that most suited their personal schedules.

For the purposes of this study, we employed non-probabilistic sampling, and for practicality, only the delegates who agreed to take part were interviewed. Given the universal nature of the object (drinking water) and that any individual would, potentially, be able to pass on their experiences of it, a decision was made to narrow the group of

respondents. The fact that we would have greater access to the delegates taking part in the PMSA meetings and that they would, presumably, be more inclined to discuss the object of this study, a decision was made to select respondents from this group of delegates. Furthermore, assuming that the social representations are construed upon everyday relations between the collective and the individual(s), an individual's discourse would represent the discourse of many.

Interviews were expected to continue until theoretical saturation became apparent (Minayo 2010), being discontinued when no new data were emerging. In total, 19 semi-structured interviews were carried out, of which four took place in the participants' place of work during their breaks, while the remainder of the interviews took place at the respondents' homes. These interviews were conducted by one researcher and were carried out in a tranquil environment with no interference from others and lasted for approximately 30 minutes.

The interviews followed a script addressing four themes: respondents' opinion on drinking water, characteristics of drinking water and its correlation to health and diseases, criteria for water usage (drinking and domestic use), and knowledge on the source and accountability for the quality of water consumed at home. At the end of the interview, a note was made of the family's income and length of residence in the locality.

All interviews had their audio recorded, fully transcribed by a single person, and then subjected to a content analysis as proposed by Bardin (2010). This technique not only allows the analysis of the whole, but it also facilitates the clustering of particularities and the identification of meaning units – that is a unity of meaning within a set of communication. To begin with, a comprehensive reading of the material was carried out aiming at the impregnation of the statements, followed by a general exploring overview of the material, and the localisation of any particularities. After that, it was identified, through inferences, units of meanings upon which the social representations of the respondents on water for human consumption were construed.

The interpretation of the testimonies was based on the psychosocial framework of the Social Representations Theory. According to this theory, social representations play a three-fold role: (1) social: building behaviours and communications; (2) affective: protecting and giving

legitimacy to social identities; and (3) cognitive: familiarising the unfamiliar (Spink 1993). Such roles are best learned by understanding the formation of social representations. For Moscovici (1978), social representations are created through two processes, namely objectification and anchoring. Objectification is the formal construct of knowledge by the individual, which according to Spink (1993), is translated as an image forming setup whereby abstract notions are transformed into something concrete, almost tangible.

Anchoring precedes objectification, but it may also take place in its sequence (Spink 1993). As a process that precedes objectification, anchoring relates to the insertion of foreign or unfamiliar thoughts within the familiar, and since any form of information processing requires reference points, the object of representation is based on one's already lived experiences (Cabecinhas 2004). Yet, when it follows objectification, anchoring refers to the social function of objectification, and as such, it provides clues on how represented elements contribute to the formation and expression of social relations (Moscovici 1978; Costa & Almeida 1999).

The informed consents of the participants or their legal representatives were obtained and the study protocol was approved by the *Comitê de Ética em Pesquisa com Seres Humanos* (Ethical Committee for Research), Universidade Federal de Viçosa, Minas Gerais State, Brazil, Protocol 40602754306, approval date: 17 March 2005.

## RESULTS

With regard to the gender of the respondents, 53% were women (totalling 10), and 47% were men (totalling nine). They resided in 10 neighbourhoods within Viçosa's perimeter with just one respondent living in one of its outskirt districts. The average length of residence in these localities was 22 years, which indicates, at least in consideration with the time span of residence, their consolidated position within their communities.

The respondents' average family income ranged between one and three Brazilian minimum salaries (\$233.00 at the time). All respondents reported consuming water from the public supply system, with the exception of one whose family primarily consumed mineral water.

The social representations are, basically, 'a system of classification and denotation, of allocation of categories and names' (Moscovici 2009, p. 62); thus, categorise means to establish a positive or negative relation with the object of categorisation; therefore, not setting a purely intellectual operation, but related to a social attitude (Moscovici 2009). The social representations are created from the mechanisms of anchoring and objectification; from anchoring, the object of representation is categorised (classified), and from objectification, the object is reproduced in a concrete image. Both processes seek to make the unfamiliar into the familiar (Moscovici 2009).

In this respect, Moscovici (2009) states that the systems thinking is process constituted 'in' and 'by' society and comprises two contexts: the consensual (corresponding to the interactive daily practices) and the reified (corresponding to the restricted world of science). So, the unfamiliar is produced, and lies mostly within the reified context, and must be therefore transposed to the consensual context, which is in its turn familiar (Guareschi 2009).

Thus, it was possible to identify from the statements and applying the mechanism of anchoring two contents of social representations: the town's 'Public Water Supply and Sanitation Service Authority' (referred to in this article as SAAE as the authors chose to keep the acronym in Portuguese to refer to the water supply provider, meaning: *Sistema Autonomo de Água e Esgotos - SAAE*); and the water element itself. Both contents were anchored to technoscientific and common sense knowledge and were reproduced in the concrete image of the water delivered to the residences (source and responsibility for the water) and its quality (organoleptic properties, absence of microorganisms and co-responsibility).

The reified context, related to the technologies and process specific to water treatment, combines features and even unfamiliar nominations to everyday practices related to this element (water). This reified context seems to qualify the water supply service (SAAE), which was categorised positively and was brought to the consensual context by its responsibility for the origin of the water (delivered to the residences through water supply network – something tangible) and for the water quality, since it is responsible for water treatment and for providing safe water.

The mechanism of anchoring linked to technoscientific knowledge, which is specific to the reified context, allowed

use of the absence of microorganisms (not identified by the senses) as representation of water quality. On the other hand, the mechanism of anchoring linked to common sense knowledge, which is specific to the consensual context, allowed use of the organoleptic properties (identified by the senses) also as representation of water quality.

This mosaic, linking the reified context and the consensual context or, at least, transposing elements between them, allowed the objectification of the consumer as co-responsible for the water delivered to the residences, uncovering the social attitude immersed in the operation of objectification that guides the construction of social representations. Table 1 lists the elements identified in the interviews and their respective anchoring and objectification.

The SAAE was objectified as both the source of, and the agent responsible for water quality (Table 1). Having said that, when analysing the narratives as a whole, one cannot fail to observe a subtle ‘personification’ of the water supplier, and the fact that most aspects regarding the water consumed at home related to this supplier.

With regard to the origin of the water, it is relevant to emphasise that all respondents have referred back to the SAAE, but none have mentioned the catchments as the source of the water consumed at home. Only one respondent did not name the SAAE, reporting that the water consumed at home was supplied from the ‘street’; which conversely refers to the SAAE.

Pursuant to the responsibility for maintaining water quality, the SAAE was indicated as its main protagonist while the municipal local authority scarcely appeared in the statements and respondents did not identify upon which municipal office such responsibility falls. This shows the lack of awareness of any ongoing surveillance programme (in this case the DWQSP – Drinking Water

Quality Surveillance Programme) and its place within the health sector.

For the respondents, the SAAE’s responsibility for water quality ends when the water is delivered at home, after that the sole responsibility for the quality of the water resided with the homeowner: ‘No use having the SAAE supplying us with good water if we don’t take good care when storing it.’ Such understanding is anchored in the practice of filtering the water: ‘[...] well, it may be well treated, but after all we do the storing and as far as storing water goes it really isn’t reliable [...]’. In addition, the habit of filtering water is passed down from generation to generation: ‘I’ve learned it years and years ago with my mum and my father that everyone must have a filter at home.’

With regard to the element water itself, the respondents’ narratives afforded the identification of which characteristics consumers expect before water is considered suitable for human consumption. Such characteristics are mainly those related to physical (colour, odour and taste) and microbiological (absence of microorganisms) parameters (Table 1), which ultimately confirms a potability standard that is represented by the ‘Purity’ criteria.

Physical parameters convey characteristics related to senses that are perceived by our sensory mechanisms. These physical parameters were reported often in a particular order: colour, odour and taste, which reflects the sequence of events performed when drinking water, sight coming first when water is initially poured into a receptacle, followed by any odour given off by the water and detected by the nostrils as the receptacle is brought towards the face, and finally, taste as water is ingested.

The objectification of purity anchored to physical senses conveys a strong meaning, to the extent that these are the elements that the respondents inform when rejecting the water supplied. Chlorine was accountable for conferring colour, odour and taste to the water: ‘[...] when it runs from the tap it is like frothy milk. I don’t know if that is normal, but there is far too much chlorine in it [...].’ ‘[...] the taste of chlorine in the water is very strong. There was a time when the water coming out from the tap was white, far too much chlorine.’

With regard to microbiological parameters, there was a consensus among all respondents that to prevent any harm to health, water should be free of pathogens (‘microbes’,

**Table 1** | Elements of social representations, objectification and anchoring identified in the narratives of the respondents

Elements	Anchoring	Objectification
WSS	Scientific knowledge	Source Duty of care for quality organoleptic characteristics
Water	Common sense plus scientific knowledge	Absence of microorganisms Consumers’ co-owned responsibility

'bacteria' and 'viruses') and should be 'crystal clear' or 'transparent'. In this regard, the objectification of microbiological parameters was also anchored to sensory mechanisms.

The relationship between drinking water and health was reported by all respondents. The recurring quotation of 'worms', 'diarrhoea' and 'tummy ache' indicates how these individuals' perception of water is anchored in their life experiences.

## DISCUSSION

This study revealed the diversity and contradictions exposed by the respondents' social representations of treated water. Some fragments of common sense are revealed as a form of practical knowledge, which builds upon daily experiences, and upon the social act of speech, mental acts and practical actions (Spink 1993). Likewise, some technoscientific knowledge can be seamlessly recognised in the narrative of the respondents.

It seems that the scientific knowledge and its intrinsic credibility give support (serving as anchoring) to the objectification of the SAAE as responsible not only for water quality, but also for sourcing the water that reaches households safely and ready for consumption. Such objectification can be determined by the simple fact that Viçosa's region is naturally deprived of water sources, which hinders the identification of new freshwater sources (especially surface waters). When the population fails to recognise catchments as water sources, it can potentially risk the accomplishment of preventive actions and educational measures, such as those related to protecting natural springs.

Such findings differ from those of Doria's (2010) review of the public perception of drinking water, which argues that even though public knowledge about water sources is often limited, the public is aware of its origin.

With respect to water quality, the respondents' failure to acknowledge the role of the health sector (namely, the surveillance programme) is likely to be related to an assistential culture that is deep-rooted in the National Health Service (SUS), which makes it difficult for the population to recognise this agency's role in promoting and protecting health, and as being the major executor of health surveillance-related actions.

The idea of co-owned responsibility for the quality of the water consumed at home can be identified in the narrative of the respondents, which in some way places the two poles of the relationship (supplier vs. consumers) on a level playing field, that is, both sides are accountable for the quality of the water.

In addition, the credit given to filters as an added 'security plus' to water quality refers back to the concept of multiple barriers adopted by the WHO, which moved away from traditional means of assessing water quality focussed on the final product only (treated water). In this regard, the WHO has proposed a holistic approach to water supply that entails the assessment of risks throughout the process – from the catchment through to the consumer, adding to it new principles such as risk assessment and management, hazard analysis and critical control points, and more recently, the Water Safety Plans (WHO 2011). The perception that the water consumed at home requires further treatment was also observed by Silva *et al.* (2010), in a study carried out in four neighbourhoods of Vitoria, in the state of Espírito Santo, Brazil.

Acknowledging that water is likely to deteriorate along its path between source (SAAE) and the moment it is consumed at home reveals, albeit intuitively, underlined elements of the holistic approach proposed by the WHO to ensure quality of drinking water. Such elements are significant insofar as they can guide educational and informative interventions, whereby arguments, concepts and ideas that make sense to the public are incorporated into the thematic content and the methodological strategies.

Moreover, the act of filtering water as a habit that is passed on from generation to generation refers to the affective component of social representations, which according to Boltanski (2004), can be seen as a way through which individuals reconnect their ties with their place of origin and condition. In this respect, some people are attached to the habit of filtering before drinking because their parents, for instance, have always done it and have taught them to do so.

Common sense appears to have been triggered (as anchoring) to the objectification of the desired features of drinking water, which in turn conform to what we would call 'required drinkable standards'. It is noteworthy that such required standards are grounded by the quality of the

water as perceived by sensory mechanisms, especially flavour (taste + odour).

Anchoring and objectification seek to transform something unfamiliar into familiar by first bringing it into the well-known sphere, so that one can control and interpret it to later replicate it among things one can perceive and touch and therefore control (Spink 1993; Moscovici 2009). In view of these, one may suggest that the objectification of elements ranked within the sensory order, such as sight, odour and taste, is otherwise less conflicting than the objectification of elements such as measurements and lab techniques applied to attesting physical parameters to water potability (colour, odour and taste benchmarks). The rejection of water that tastes and smells of chlorine exemplifies such a mechanism where the object of representation, namely water, is thought from one's previously lived sensory experiences, such as the strong odour given by, and the abrasive effect of chlorine that is often present in substances for household cleaning. The negative association of chlorine in drinking water has been reported in existing studies carried out in different contexts (Julião 2003; Piriou *et al.* 2004).

The characteristics of water associated with sensory mechanisms are relevant as they may interfere with the acceptability of and the consumption of the water supplied by the public system, to the extent that such significance was recognised by, and incorporated into the new organoleptic standards of the latest edition of the Brazilian legislation for drinking water (Brazil 2011). Understanding the organoleptic standards as elements that will ensure the acceptance of water supplied to consumers is crucial to planning the water supply services and the drinking-water quality surveillance. According to Doria (2010), in a study based on Gordon (2010), for the stakeholders responsible for water supply, taste should be deemed the key element of acceptability for the population.

According to McGuire (1995), when consumers detect, say, any unfamiliar taste in the water, this can be associated with risks. In this respect, the presence of chlorine, even within its permissible levels, may trigger rejection and cause consumers to switch to other sources of water that may not be subject to controls and monitoring. In view of that, an interesting strategy would be to consider the population as a sentinel on the lookout for eventual problems related to water quality and/or health risks. For instance, when consumers express their views on characteristics such as odour, it should be taken on

board not only as criticism, but as a trigger for reshuffling control and surveillance practices, reorienting the relationship between consumers and providers and thus taking such a relationship to a dimension that outreaches vested commercial interests only. Such a view gives prominence to the role of the consumer to ensuring their rights and active participation in promoting health. In this sense, the development of spaces, process and practices enabling the dialogue between consumers, water supply providers and the health sector (surveillance services) would be interesting.

The interpretation of the meaning units ('SAAE and water') suggests that both these units are interconnected, yet they are contradictory when the social representations are elaborated. Thus, while on one hand, the respondents in this research recognised the importance of the SAAE in treating the water, on the other, this very same water (treated by the SAAE) is rejected due to concerns with chlorine affecting its purity.

The concept of contagion discussed by Callaghan *et al.* (2012) about how the public perceives recycled water can be associated with this representation. Based on Rozin & Nemeroff (1990), they argued that the perception that the contact between two substances, or objects, can permanently and negatively change the properties of one or both elements, explains why consumers are strongly inclined to resist and are less keen to use recycled water for drinking or to wash with (Callaghan *et al.* 2012). Following this line of thought, the results of this present study suggest that the trigger of water-rejection responses lies in the perception that the contact between water and chlorine in the treatment stage alters its properties (its purity).

The contradiction expressed by the respondents when elaborating this representation should not be understood as inopportune or inadequate, but rather inherent to the construction of social representations, since its establishment refers to the conjunction of different elements, at times conflicting, at times in harmony, but in constant transformation and reliant on the negotiations among the subjects themselves and surrounding reality (Gazzinelli *et al.* 2005; Moscovici 2009).

## CONCLUSION

The proposal of a study geared to capture the social representations of drinking-water quality afforded not only the

identification of perceptions, attitudes and behaviours, but it allowed an insight into the common sense constructs about water, which it is suggested appears to be the main contribution of this research.

We have not disregarded that the results of this research may reflect the representations of a particular group insofar as the individuals interviewed were involved in discussions related to the subject matter of this study. Nevertheless, following the Vygotskian tradition of seeing each person as a social entity and therefore a living symbol of the group they represent (Rego 1995), we have assumed that the respondents of the interviews represented the communities in which they live.

We believe that the recognition of the social representations of drinking water, within a specific social context, allowed the identification of significant elements that could contribute to positioning the consumers vs. services relationship on a level playing field, enabling an effective dialogue and exchange of knowledge, formal or otherwise, for the benefit of safeguarding public health.

This research identified the objectification of the local SAAE as the entity responsible for the resource (drinking water). On one hand, if this identifies the player responsible for controlling water quality, it does not pinpoint the health sector as the protagonist at the forefront of the DWQSP. Concomitantly, it has not excluded the participation of consumers in maintaining the quality of the water when it reaches their households. Such recognition can be a facilitator for the DWQSP actions directed to the use of water and, consequently, health promotion.

Changes in the physical parameters, colour, odour and taste, connected to the presence of chlorine in the water as the main driving force behind its rejection, suggest an underlined need to review the focus of the actions, particularly the DWQSP educational strategies geared, mostly, to notions of hygiene and awareness of water-borne diseases. It would be important to adopt an approach centred on the organoleptic characteristics of water since the manner in which the consumer population perceives or deal with such characteristics may influence their decision of acquiring an unregulated source of water.

This study produced results, which corroborate earlier literature, that suggest the relevance of considering the perceptions and demands of the population when assessing and

actioning more effective and equitable public health programmes and policies. That is to say, merely providing technical assurances of water safety does not suffice; the population ought to share the idea that the water is safe for they are the subjects of consumption and of the right to safe water.

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