International Journal of Advanced Education and Research
ISSN: 2455-5746, Impact Factor: RJIF 5.34
www.alleducationjournal.com
Volume 1; Issue 10; October 2016; Page No. 36-40

Social representations of rural women on nutrient–enriched tilapia fish foods with *Moringa oleifera*

[1] Jimmy T Masagca, [2] Aurora E Araojo, [3] Meda B Mercado

Catanduanes State University, Virac 4800, Catanduanes, Philippines

Abstract

Representations were examined in different focus groups during university-sponsored trainings and observations on "talk and actions" of selected rural women as social groups from the island province of Catanduanes in Bicol Region, Luzon, Philippines (Lat 13.67° N, Long 124.12° E). Each group was homogeneous, as defined by age, gender and schooling. During the interviews and case analysis, packages of "malunggay" (*Moringa oleifera)* nutrient–enriched fish foods (NEFF) from the cichliid fish (Tilapias) and brochures on how to process these foods were presented that served as stimuli among the women subjects. Thematic and content analyses revealed several dichotomies (i.e. aromatic and pungent) that characterized the representational field of the women subjects. Many metaphors were used by the women to describe these enriched foods with *Moringa* being associated metaphorically with meaningful life, hunger, 'junk foods', sufferings, luck, freedom, discovery and inventions. Chronological references of the representations centered on advancement of fish processing within the local Catanduanes island cuisine. The perceived nutritive value of these NEFF was an important argument, noting that the subjects continue to engage in selling snack foods enriched with *Moringa* leaves. The dimension of "micronutrient" as divulged by the innovative stance and nuances displayed with their representations that are initially molded within the general feeling of 'dislike' of Tilapias (Cihliidae) reversed the unpopular fish species among coastal dwelling communities. However, the renewed feeling of acceptability as enriched food products was displayed and newly recognized roles of rural women to take the lead in convincing to children and their mothers in their neighbors on the dimension of innovativeness in fish processing. Based on the women reflections, accelerating an "inventive sense" can popularize conceptions found in the technology infusion projects for fish processing and post-harvest capability building among women of the island province to affect their thinking and practice in household fish food preparation to reduce food insecurity in the local population.

Keywords: Tilapia, fortification, women, Catanduanes, food security, MND

1. Introduction

Tilapias (*Oreochromis*, *Sarotherodon* and *Tilapia*) possess an impressive range of attributes making them the most studied fish groups on aquaculture, human nutrition and innovations. Due to the diverse functionality of different plant extracts with the generally recognized as safe (GRAS) status for use in foods (Wang *et al*. 2012), and their incorporation into fortification of foods (Adeleke & Odedeji 2010) [1], the need to study nutrient enriched tilapia foods for snacks and meals in the rural households of an island province is clearly recognized.

Micronutrients deficiency (MND) is one of the various problems that prevent the growing Philippine rural population from achieving their full intellectual and physical potentials. Likewise, it can lead to many nutritional disorders (e.g. blindness, goiter, etc.) and declining of the mental, intellectual and physical development in general. Responding to this MND problem, governmental and private institutions have to find solutions for its eradication. Aside from supplementation, education and disease control, nutrient enrichment of many staple and common products is one of the most appropriate and best ways of eliminating or reducing the number of people with MND. Hence, the Catanduanes State University (CSU) undertook an initiative under the Catanduanes Sustainable Technology Infusion in Inland Fisheries Development Program (CSTIFDP) funded by the Philippine Bureau of Fisheries and Aquatic Resources (BFAR) by involving women to be engaged on tilapia enrichment with *Moringa oleifera*.

Nowadays, there is an increasing interest in food fortification with omega-3 long-chain polyunsaturated fatty acids (PUFAs) because of their known health benefits (Ruxton, Calder, Reed, & Simpson, 2005). Moreover, Adeleke & Odedeji (2010) [1]. assessed the acceptability of bread samples produced by fortification of wheat flour with Tilapia Fish Protein Flour (TFPF) in varying proportions, while Dhanaphal *et al.* (2010) focused on the physical, chemical, and microbiological qualities of fresh tilapia meat that revealed its suitability for the preparation of ready to eat fish curry packed in retort pouches. With the fatty acid profile of tilapia meat necessitates the fortification with polyunsaturated fatty acid (PUFA) and the use of plant extracts from malunggay (*M. oleifera*) to increase the nutritional value of these processed tilapias. The tilapia (*Oreochromis niloticus*) was previously studied by incorporating into tilapia hepatic and muscular total lipids. Based on the results on the application of vegetable oils to partially substitute fish oil for tilapia can be recommended in relation to the most important dietary lipid quality indicators.

In order to understand the dimensions of innovation in processed fish foods, this inquiry used the Social Representation Theory of Serge Moscovici (2003, 1981), which is a social psychological framework of concepts and ideas to study psycho-social phenomena in modern societies (Wagner *et al.* 1999). This can be "properly understood as these are seen to be embedded in historical, cultural and macro-social conditions" of the rural people specially the women. A social representation is a collective phenomenon pertaining to a community which is co-constructed by

individuals in their daily talk and action. Wagner *et al.* (1999) summarized that social representation is "an ensemble of thoughts and feelings being expressed in verbal and overt behavior of actors which constitute an object for a social group".

In the present study, talk and actions were observed among members of women organizations as social groups in the study areas. A social group (a minimum of 4 persons), which is a set of at least 2 persons which confront at least one other group in the social setting that can be men, women, barangay leaders, children, students, teachers, administrators, other sectors of the local communities. Because a group is a subset of a universe of people, the shared understanding of their world and of the objects composing it provides the ground for communication and other forms of co-action. The phenomena composing the local world of a group are social objects. There is no doubt that things or objects can be described by frames, which are provided by physics, chemistry, biology and the social sciences. The descriptions extended by these frames are valid descriptions by themselves but are said to be inappropriate to capture the specific social characteristics of objects constituting the local worlds (Wagner *et al.* 1999). Social objects are constituted by representations, i.e. discourse and concerted action of the members of the group that maintain a homogamic communication (=people prefer to communicate to others of similar opinions and to read newspapers which are likely to confirm one's own beliefs instead of confronting opposite opinions).

This study was carried out to determine the innovative dimensions using quantitative and qualitative approaches. The different aquatic species of found in the rivers were determined; and perspectives on power and decision making; and needs, priorities and aspirations were described among women. Three nutrient-enriched tilapia fish foods [*tilapia fish balls (TFB), fish siomai (TFS)* and *fish curry (TFC)*] from *Oreochromis* spp. and *Sarotherodo*n were processed; the acceptability as to sensory evaluation was already carried out in an earlier study (see Morales *et al.*, 2013) [13] and social representations of the rural women were determined. Likewise, livelihood and health-promoting activities among selected women who are the wives or relatives of these farmers-fishers involved in tilapia aquaculture production were also studied.

2. Methodology

The participatory research process was utilized with collaboration among academics, the local government units and peoples' and women organizations in the island of Catanduanes, Bicol Region in Luzon, Philippines (Lat 13.67°, Long 124.12°). A mixed-method of quantitative and qualitative processes was applied here with standardized fish processing techniques and the field of Social Representations within the dimensions of innovation and novelty (Morales *et al.*, 2013) [13].

This study recognized that the values and institutions of any given society were viewed to have an internal logic. It was a legitimate notion among us that the role of women could be studied well from inside by the immersion of the researchers to these communities. This study applied the ethnographic or fieldwork research. The researchers were practically concerned with the interconnectedness of the life of the women in the advent of new developments in the Philippines by having fieldwork and community-based study in post-harvest technology with fish processing. Certain property of story-telling or conversation (*kwentuhan* or *pakikipagkwentuhan* in the Filipino language) was employed. This ethnographic technique is a naturally occurring phenomenon or process of sharing and telling stories among individuals to figure out or to make sense about their world and their experiences. Javier (2004) [9] stresses that *kwentuhan* is an occasion for exchange of information, ideas, insights and individual experiences. This was basically a lively and always a happy group discussion in which the participants were actively involved (such as in the house, over meals, in public places, fiestas, marriage events, etc.).

2.1 Data gathering procedure for the quantitative aspect

Standard procedures for the processing of fish balls, siomai and fish curry were followed. Likewise, evaluation of fortification of the tilapia foods adapted the procedures of Mabesa & Tan (2006). The sensory evaluation was done by female panelists who were all teachers and professors in food technology and home economics. It was done by first preparing the master sheet and filling- up necessary information. Three- digit random code numbers were then assigned to each sample per judge and the order of serving of the samples was determined. The sample containers were coded and score sheets were prepared. Samples were portioned in a container on large table marked with three- digit code. Trays were set- up and were then served to the judges, each containing a glass/ bottle of water. Samples were evaluated. Then, the results were decoded by writing the appropriate numerical value of the scale that reflects the judge's decision about the intensity of each of the quality attributes being evaluated to the right of the code number (Mabesa & Tan 2006).

2.2 Participants

Participants of the study were women who are involved in the fisheries sector and the natural resource management, the MAO, the agriculture staff, fisher folks, farmers, barangay leaders and youth leaders. These participants were drawn from the areas covered in the BFAR funded program at CSU, CSTIFDP in the tilapia fortification (Morales *et al.*, 2013) [13]. Clearly, the study used a qualitative approach by hiding the actual identities of the participants. To actually conduct this study in numerous localities, researchers normally required to identify the people concerned. However, it was assumed that participants from other localities did not allow the conduct of the study, so that identities were not being considered here.

2.3 Instruments of the study for the qualitative aspect

After identifying the participants, some were approached personally during the field visits and also the recommendation of the barangay captain and other local officials. Then, those who had expressed interest to participate in this qualitative research were contacted. The researchers explained the study, addressed questions and concerns, discussed their backgrounds and generally got to know the women participants through the Mayors, Barangay Captains and MAOs.

A total of 127 women participated in this study over a three – month period from March to May, 2012. Samples consisted of only 45 women in studying social representations. Participants came from selected barangays in northeastern and southern Catanduanes covered in the CSTIFDP program. The average

age of these women was 40 (Morales *et al.*, 2013) [13].

Interview-based protocols were essential in the present study. During the course of the study, some participants presented idealized versions of themselves and their situations local women and men living near the river and estuarine. In order to address this variation, the inductive-generative approach was employed for reliability and analysis. In regard to trustworthiness, reliability and consistency in the responses of the participants, the researchers pursued multiple interviews with each woman and some man-participant and tried to detect certain inconsistencies in the data provided. Available pieces of information from the local officials were compared. In the analysis, the inductive-generative approach was applied by emphasizing on the meanings and notions from the idealized responses and then compared to the existing literature about gender in fisheries or fish processing and innovations. There were possible similarities in the concepts generated by other inquiries related to gender analysis such as that on the theory of gender bias, but the researchers tried to be vigilant about the inappropriate inclusion of the responses. The researchers attempted to carry – out a line-by-line analysis and discuss among the researchers the connections of the said specific data set to the over-all or entire data set. In this way, certain conflicting or contradictory views were resolve.

3. Results and Discussion

During the study, the researchers discovered that several species of freshwater fishes and estuarine areas are abundant in the places under study as shown in Table 1. This was particularly based in the over-all processing of aquatic products and fortification of cichliid fishes and other endemic freshwater aquatic organisms abundant in the areas under study such as "Kabonbon" (Gobiidae & Eleotridae), "hito" or catfish (Clariidae), tilapia (Cichliidae), "urang" or freshwater shrimp (*Macrobrachium rosenbergii*), "baranak" or mullet fish (Mugilidae) and tabagwang (*Jagora* spp), an ovoviviparous freshwater gastropod.

Generally, women's decision- making to participate in this project in fortifying, packaging and marketing of tilapia were influenced by following: (1) their own initiative and interest to fortify tilapia products; (2) decisions of both the husband and wife; (3) encouragement from barangay officials and the women's group; (4) nutrition enhancement for their children; (5) livelihood diversification and (6) business prospects engaging in worthwhile activity. As a caring mother, the majority of them were mostly concerned with the nutritional intake specifically the MND of their children for better performance in school. It was realized that fortified TFS, TFB and TFC were one of the prospected sources of nutrients. Some were only got interested for the reason that they wanted a worthwhile activity to be engaged with. Only few thought of it as business prospects to become a source of family income. This observation is not congruent to the assertion of Geheb (1997) [7] who reasoned out that people have joined fish processing because of their desire for cash income. Perhaps these women involved in the study have not fully understood the importance of FTFs in increasing income.

When they participated in this fish processing or nutrient-enriched tilapia fish foods project, they projected to change their daily routinary activities and increased their family income at home because aside from the routinary activities that they had, most of their time would be allotted in FTFs processing, packaging and marketing as they generated income. However several constraints that women faced in their involvement in the implementation of the university project were (1) insufficient funds, (2) infrequent insufficient tilapia harvest, (3) weather disturbances; and (4) inadequate support from other sectors. These findings also support the study made by Nenna (2012) [16] in Nigeria on factors influencing women participation in fisheries and marine fishing. Nevertheless, queries for possible livelihood trainings to be conducted on the production, packaging and marketing of fortified tilapia products as a support for women who wanted to be engaged to the said activity yielded a positive response.

Based on the descriptive story-telling or conversation with women respondents, the researchers found out that their needs were more concerned on how they could help their husbands to increase their family income. In- line with these, their priorities at the time that the university implemented this project were also to increase the family income level and to increase the family nutritional intake and food security as well. Therefore, respondents viewed that the project on tilapia fortification was a suitable activity to meet their needs, priorities and aspirations to increase their socio-economic stability. They believed that it would provide them the opportunity to participate in livelihood diversification initiatives. Also, in the future, when they got involved in this activity on fish fortification, they could help in poverty alleviation and as private individuals they could haves helped in eradicating MND in their locality. These findings are most likely of congruence to the women in Lagos as observed by Fregene & Bolorunduro (2009) [6] on food security and expenditure patterns fishing communities.

Initially, baseline surveys conducted in seven (7) barangays of three municipalities in Catanduanes delved on the acceptability of fortified tilapia products such as fortified tilapia fish balls (TFB), tilapia fish siomai (TFS) and tilapia fish curry (TFC). Officers and members of women organizations, e.g. Sto. Domingo Women Group, RI Women Group, K-4 plus and BHW consulted have shown keen interest and gave importance on the said fortified tilapia products for micronutrients deficiency (MND) solutions. FTF sensory evaluation show higher acceptability level (average scores= 6.7). Table 4 showed the mean sensory scores in the sensory evaluation results of 45 women respondents using quality scoring.

Fish balls had the highest general acceptability compared to that of FC (with 6.6) and fish siomai (with 6.7). The values generated for fish balls were generally the highest in color, texture and flavor. Texture of the TFC showed the lowest value obtained at 3.2), which is below the 50% scale of 7.0. As emphasized by Miyata & Manatunge (2004) [11], the importance of appropriate timing introducing an alternative livelihood approach, which can determine whether villagers adopt or refuse the new approach, e.g. temporary low market prices would negatively affect the degree of adoption. There seems to be an agreement to this finding as previously known.

3.1 Social representations (SR) on the FTFs in the dimension of innovations

Social representation theory provides a useful framework for examining everyday knowledge and the way scientific discourse enters the domain of everyday thinking (Backstrom *et al.* 2003). Social representations aim to transform what is disturbing and unknown into something familiar and known; they are a form of collective symbolic coping with new

phenomena (Wagner & Kronberger 2001) [22]. In the present study we looked into the knowledge of women and as to the innovative dimensions of FTFs.

The SR of the FTFs was determined with a total of 45 women in 2 fish processing demonstrations and 3 focus groups. The groups were homogenous as shown in the age of the women, gender and schooling. Thematic and content analyses of the interview data showed several dichotomies (Table 3) characterized the social representation on the FTFs. Many metaphors were used by the women to describe the FTFs being associated metaphorically with, for example, fortified tilapia foods being associated with 'healthy life', 'nutritious foods', 'hunger', 'sufferings', 'luck', 'freedom', 'discovery' and 'inventiveness'. Chronological references of the women representations focused on the development of food processing and *Catandunganon* cuisine. The perceived nutritive value of FTFs was an important argument for younger women but not for the older ones.

Table 3: Dichotomies as to the positive and negative words expressed by the women characterizing their social representations.

Positive Words	Negative Words
Not fishy (*bakong malangsi)*	(fishy)*Malangsi*
Managom (delicious)	*Bakong managom* (not tasty)
Mariputok (concentrated)	*Lasaw* (diluted)
Manatok (creamy)	*Matabang* (lacks salt)
Mahamot (good aroma)	*Maanggo* (pungent)
Di nakaribong (not dizzy)	*Nakaribong* (dizzy)
Mayuta (soft)	*Matagas* (hard)
Dugang (dry)	*Labo* (wet)
Mapulot (sticky)	*Bokong mapulot* (not sticky)
Bakong maasgad (not salty)	*Maasgadon* (salty)
Tama sa pagnamit (just enough for the taste)	*Kulang sa namit* (lacks taste

In the framework of inventing new tilapia processed foods at CSC, social representations of the women are shaped to cope with the feeling of eagerness evoked by the 'novelties' or 'innovativeness' of fortified tilapia foods seen and demonstrated to the women. These fortified foods have roles in 'socio-cultural' acceptance of new products by making the women familiar with the nutritive aspect, health and safety dimensions.

Overall, the results of the SR study on the FTFs reflect the development of a new "scientific sense" and 'innovative sense' among the women in Catanduanes in which there could be a tendency to popularize scientific views that are embedded in the process of 'urbanizing' and 'globalizing' the rural areas through research, development and extension initiatives of the state college.

4. Conclusion and Recommendation

Women respondents were more concerned on the nourishment that the nutrient-enriched tilapia fish foods with *Moringa* could provide additional income to their family aside from having a business and worthwhile money- making activities on their own by dealing with processing, packaging and marketing. Subjects viewed that the project on tilapia processing was a suitable activity to meet their needs, priorities and aspirations by increasing their socio-economic stability. Sensory evaluation yielded higher acceptability level; revealed several dichotomies of the representational field; and metaphors used by women were associated with income, micronutrient deficiency (MND) and innovations. The perceived dimension on MND was a vital argument and their innovative stance was formed on the acceptability feeling. Newer women roles of explaining among their neighbors on novelty for accelerating an "innovative sense" in the rural areas can popularize conceptions on post-harvest technology, capability building, advocacy, and their thinking and practice in household food preparation with the use of tilapias. There is a need to empower women fish processors technically and economically to be able to participate in programs and projects on fortification.

5. Acknowledgement

An earlier paper was prepared prior to this article (see references, Morales *et al.* 2013) [13] and presented in a forum organized by the Catanduanes State University. We acknowledge the contributions of Monet Tugay, Ma. Cecilia V. Tiu, Delia S. Sorra, Ma. Luz Floralde, Danilo Murillo, Imelda Bernal, and other researchers of the Catanduanes Sustainable Technology Infusion for Inland Fisheries Development Program funded by the Bureau of Fisheries and Aquatic Resources, Regional Office V in Legaspi City, Philippines.

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