EMPOWERING WOMEN: NUDGING AS AN INFLUENCE TO ENHANCE THE EFFICIENCY OF WOMEN DAIRY WORKERS

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ABSTRACT

For the socio-economic growth of the nation, particularly in developing nations, women play a significant role in livestock-rearing operations. They spend five to six hours daily in dairy and animal husbandry activities in addition to their daily household responsibilities. Due to the male-dominated society, they do not get proper recognition and respect for their hard work at home and in society. Nudging is a term that is used in behavioral economics as a way to move ahead with gender equality. It is any small feature in the environment that attracts our attention and alters our behavior. The main objective of the current study was to use nudging as an influence to attract dairy women workers by training them with modern husbandry practices to increase the productivity of livestock. This would in return empower them in society due to the improvement of their role in the family. This study was conducted in two districts of Punjab province. A multistage sampling technique was used to select a sample of three hundred and twenty female farmers who were engaged in informal value chains; the collected data were processed using suitable statistical techniques and pertinent analysis was carried out using appropriate statistical models. The Schedule-structured interview was used as a tool for data collection. To enhance the income of local dairy farm women, training was imparted with the use of a nudging approach. The findings of the study showed that these activities significantly increased the income of rural women. Increasing the engagement of females in the rearing of dairy animals is an important means to enhance gender equity and will contribute to gender equality in society.

Keywords: Dairy value chains, Nudging, Women empowerment, Women participation

1. INTRODUCTION

The issue of women's empowerment is gaining importance on national and international platforms due to their low socioeconomic background and disempowerment, and global women's empowerment is a new emerging concept today. Women have suffered most disadvantaged groups throughout history, and the extent of disempowerment varies by state, society, culture, race, religion, and location. Even in the 21st century, violence against women still exists, and social taboos still bind most women and face lifelong hardships (Mandal, 2013). Women empowerment quantification is challenging, but there is some standardized measure through which we can measure women's empowerment in agriculture and livestock, for example, Women Empowerment in Agriculture Index (WEAI) and Women Empowerment in Livestock Index (WELI) (Colverson et al., 2020; Mwambi et al., 2021).

Livestock has a significant potential to empower people, especially women. They provide millions of women in the Global South the chance to produce foods high in protein for consumption at home and sale. Livestock can increase a woman's ability to make decisions and give her access to cash and chances to diversify her livelihood. Sustainable livestock development requires using the potential of animals to empower women (Galie et al., 2022).

Over the years, livestock has emerged as Pakistan's largest sub-sector of agriculture and has become the most significant contributor of value addition to agriculture. This industry generated 11.5% of the nation's gross domestic product and provided 60.1% of the value added to agriculture in FY 2021. Livestock farming employs more than 8 million rural households, who depend on it for 35–40% of their revenue (Pakistan Economic Survey, 2021). Gender discrimination is prevalent in rural areas of Pakistan due to traditional norms and customs. Men have more power and preference than women to learn and make decisions (Masood & Jamil, 2015).

The most significant economic sector in Punjab is dairy farming, which supports rural lives and is a significant source of work for women at the family level. The maintenance of livestock is a crucial task for village women, and this industry is regarded as Pakistan's "black gold" (Awan et al., 2021). The dairy industry is a significant source of profit and nourishment and provides more urban employment opportunities. Dairy producers primarily raise cows, buffaloes, sheep, and goats to produce food and generate revenue (Uddin et al., 2011).

All animal management activities are more prevalent among women, who devote five to six hours daily to them in addition to domestic chores (Afridi et al., 2009). They devote most of their daily routine to various livestock tasks like collecting dung and making dung cakes, watering, milking, bathing, cleaning animal sheds, and sometimes grazing animals. They also perform many other demanding tasks such as cutting fodder, animal husbandry, and marketing (Ullah et al., 2021; Manzoor et al., 2018; Akhtar et al., 2008; Arshad et al., 2013; Andaleeb, 2017; Luqman et al., 2006; Saghir et al., 2005; Khan et al., 2012). Married and low-income females participate more in dairy production activities to support their husbands (Kathiriya et al., 2013). They spend more time during the day in dairy farming, and low economic background is also a significant factor in involving women in dairy farming and crop cultivation. Young, unmarried, and older women are less involved in working as dairy farmers (Khan et al., 2020). Women bear the burden of unpaid labor inside the home and unpaid work outside the home, and in some cases, women sacrifice their health to take care of their dairy animals along with other duties (Bain et al., 2018). Women first heard about this final duty from their parents when they were children (Spanevello et al., 2020).

Women, especially in Pakistan, lack decision-making power regarding livestock rearing. Women cannot decide to sell the milk of their active milking animals in the market and at home and to sell their active milking animals without their husbands' permission (Ogdand & Hembade, 2014). Women's contribution to household income is often hidden and unrecognized (Bain et al., 2018).

Female farmers are at higher risk of injury while handling dairy animals as they may be injured during milking and animal care. Rural farmers need more safety training and awareness on handling dairy animals (Wilmes & Swenson, 2019). Diseases and poor management practices are significant causes of the low productivity of dairy animals. Farmers have a limited understanding of infectious diseases and risk factors in Pakistan. Mastitis, FMD, hemorrhagic septicemia, and blackleg are the leading causes of low milk production and death of cows and

buffaloes in Pakistan (Tulachan et al., 2002; Duguma, 2020; Khan & Usmani, 2005; Ali et al., 2006; Khan et al., 2013; Ghafar et al., 2020).

According to Zia et al. (2011), there are two types of chains called informal and formal value chains; milk is supplied to consumers through these chains. Pakistan is regarded as one of the top nations that produce raw milk. Pakistan's dairy sector has historically been dominated by the smallholder private sector, unlike the production systems of developed countries. The milk production system in Pakistan is influenced by farm location, the number of animals, and livestock management activities. The absence of cold storage facilities leads to the loss of milk, as milk is traditionally transported long distances after production in extreme weather conditions (Tahir et al., 2019). The absence of proper pricing mechanisms, quantity, and quality of milk in these chains is a significant hindrance to the growth of this industry (Godfrey et al., 2019).

Women play an important role in dairy value chains in Pakistan. Empowering women is critical to the future of the dairy value chain as it provides sustainable livelihoods for women. It helps women make decisions for themselves, alleviate poverty, and generate income, inclusive growth, and economic independence. The dairy sector plays an important role in the social and economic empowerment of women and in bringing about positive changes and sustainability in their lives. Poor health, rearing, and production of dairy animals, lack of decision-making power, limited training opportunities, and inadequate institutional support are the main barriers that prevent women from growing and reaping maximum returns for their efforts. This research used the nudge theory to address these barriers to increasing women's productivity and income in the dairy value chains. The main objective of the study was to gauge the impact of nudging on the development of dairy value chains for women's empowerment.

According to the Cambridge and Oxford Dictionaries, a nudge means to touch someone with your elbow and push gently. The reason to nudge someone with your elbow is to get someone's attention and encourage someone to do something with a light touch or push. Nudge is a behavioral economics idea that uses indirect suggestions and positive feedback to persuade people or groups to change their behavior and thinking. Two American academics from the University of Chicago wrote a work that helped popularize the idea of nudge. The publication year for the book was 2008, and its title was Nudge: Improving Decisions About Health, Wealth, and Happiness. The book's first author was Richard H. Thaler, an economist, and Nobel laureate; the second was Cass R. Sunstein, a professor at Harvard Law School. The Economist called it one of the best novels of 2008, and it got overwhelmingly favorable reviews. To recognize Thaler's received the Nobel Memorial Prize in Economics in 2017 for his accomplishments in behavioral economics. Richard Thaler and Case Sunstein gave importance to the nudge theory in 2008.

Nudging can help boost dairy farmers' output and significantly contribute to the financial empowerment of farmers, particularly women farmers. Most of the literature review on nudging was found to focus mainly on healthy food choices, and dietary behavior. Many studies have been done on the fact that nudges have increased healthy food choices, but little literature is available on dairy value chains and nudging (Kroese et al., 2016; Hummel & Maedche, 2019; Arno & Thomas, 2016).

This study will be of great value to those who are directly or indirectly involved in research on women empowerment, nudging, and dairy value chains.

2. MATERIALS AND METHODS

Population

To conduct the study meaningfully, a careful selection of women engaged in dairy activities at the household level was taken. Punjab is famous for livestock rearing and management activities. The population of the present study consisted of women belonging to rural areas of the district of Sargodha and Hafizabad from Punjab province who participate in the informal dairy value chains. The nature of the study was descriptive and action.

Sample

A multi-stage sampling technique was used to select the study area from Punjab province. Sargodha district is divided into seven tehsils and the Sargodha tehsil is selected for research. In this tehsil, there are sixty-two Union Councils. Hafizabad is a diverse district in a livestock population. The district is administratively divided into two tehsils, namely Tehsil Hafizabad and Pindi Bhatian Tehsil. Out of two tehsils, Hafzabad tehsil has been selected for this study. Six union councils were selected from both Hafizabad (Uc #5, 6, 10, 15, 19, 24) and Sargodha tehsils (Uc #74, 79, 80, 81, 82, and 101). A sample of three hundred female respondents was selected from districts Sargodha and Hafizabad who were engaged in an informal value chain process through purposive sampling. Twenty women were also selected from district Sargodha separately for nudging purposively. To increase the profit of the farmer two nudges were applied to the milking animals for thirty days through a training session for the women regarding the milk production of the dairy animals.

Tools for Data Collection

A well-designed structured interview schedule was used to collect data from selected farmers engaged in the informal dairy value chain. The research tool was developed in the English language but interviews with women farmers were conducted in the local language to get rich data from the respondents. Nudging data were collected daily from respondents on milk production for comparison in notebooks.

Data Analysis

After gathering the data from the respondent suitable statistical techniques and appropriate statistical tests were used to analyze the data. The result of quantitative data was presented in the form of simple frequency tables, graphs, etc.

3. RESULTS AND DISCUSSION

Table 01: Distribution of the espondents regarding land holding

Landholding (Acres)	Frequency	Percentage
Landless	156	52.0
up to 2.5	30	10.0
3 to 4.0	61	20.3
5.0 to 10.0	43	14.3
>10.0	10	3.3
Total	300	100.0
Mean (Std. dev)	2.07 (1.26)	

The results of table 01 show that the majority (52.0%) of the respondents were landless. In contrast, the land holdings of the respondents were divided into five categories, namely landless, small, marginal, medium, and large groups. 20.3 percent of respondents fall under the small

category, while 14.3 percent of respondents said they have medium land, and only 3.3 percent of respondents have large land. Pakistan is an agricultural country dominated by small farmers. Livestock, human capital, and farm size are of great importance to the livelihood of poor rural farmers (Saeed et al., 2022).

Production of dairy products from livestock is the most suitable way to increase their source of income. Landless and small farmers improve their livelihoods by participating in livestock production activities. Andaleeb (2017) and Afzal (2009), and Hasan (2008) have also analyzed the relevant data, and the results also strengthen the findings of these authors that the majority of respondents belong to small land holdings. Khan et al. (2012) also showed similar results that most of the farmers were smallholders, and their land holdings ranged from 2 to 4 acres.

Table 02: Distribution of the research participant according to their family system in the house

Type of Family	F	%
Nuclear	126	42.0
Joint	156	52.0
Extended	18	6.0
Total	300	100.0
Mean (Std. dev)	1.64 (0.59)	

In the traditional system of Pakistan, people live in a joint family system due to the customs of the region. A joint family system is preferred in rural areas because of high dependency on parents, limited resources available, landlessness, and poor economic condition. People in developed countries prefer to stay nuclear than joint. Data on respondents' family type, whether nuclear, joint, or extended, is described in Table 02.

According to the statistics, 52% of the interviewees belonged to a joint family structure, while 42% belonged to a nuclear family. Only 6% of respondents were living in extended families. Women farmers living in joint family systems participate more in agriculture and livestock activities than male farmers. The joint family system has a division of labor that facilitates women to participate more in livestock activities.

Amin et al. (2010) also show results consistent with the above data on the family system in Punjab province. Data was collected from Faisalabad, and a sample of 384 respondents was selected for the purpose of the study. According to the findings, the majority of interviewees (70.6%) lived in combined families. The culture of a joint family system in rural areas of Punjab mainly exists due to limited resources and low socioeconomic backgrounds. The data also show that joint family systems are mainly headed by male family members, and women participate more in livestock activities. Similar findings are also reflected in the findings of Hassan (2008), who concluded that the majority of the respondents (53.4%) lived in a joint family system. Khan et al. (2020) found similar results in their study, showing that 53.7% of the participants were members of joined families.

Table 03: Distribution of respondents regarding household size information

Members of the family	F	%
1-5	68	22.7
6-10	175	58.3
11-15	53	17.7
Above 15	4	1.3
Total	300	100.0
Mean (Std. dev)	7.7(3.0)	

Since the majority of the interviewees were from joint families, a sizable family number was anticipated. According to Table 03, 6–10 people were living in 58.3 percent of the selected homes, and there were more than 15 people in 1.3 percent of the households. 17.7% of respondents had 11–15 people living in their homes, compared to 22.7% of sampled families that had 1–5 people. Similar findings from studies by Ullah et al. (2021) and Andaleeb (2017) revealed that the majority of interviewees had 6–10 family members living with them.

Table 04: Distribution of participants' frequencies based on the size of their herd

Number Of Animals	F	%
1-5	161	53.7
6-10	95	31.7
11-15	18	6.0
16-20	11	3.7
above 20	15	5.0
Total	300	100.0
Mean/Std. dev/median	6.7/4.6/5.0	

The results of Table 04 show that most respondents (53.7%) had a herd size of between 1 and 5 animals. The second highest percentage (31.7%) indicated respondents had herds between 6 and 10. Only 5% of respondents said their herd size is more than 20 animals, and 3.7% of respondents said their herd size is between 16 to 20 animals. Only 5% of respondents said their herd size was more than 20 animals, and 3.7% of respondents said their herd size was between 16 to 20 animals. Ullah et al. (2021) showed similar results in that the majority of the respondents in the study area kept 1-5 animals in their homes. The average herd size of a family was 6.74 animals.

Table 05: Distribution of participants based on their relationship to the head of the household

Relationship with the household head	Frequency	Percentage
Daughter	89	29.7
Daughter In Law	36	12.0
Myself	6	2.0
Sister	8	2.7
Wife	161	53.7
Total	300	100.0

The results showed that most of the husbands (53.7%) were the household heads of most of the families. Only 2.0 percent of the respondents claimed that they were the head of the household, while 29.7 percent of the respondents said that their father was the head of the household. The results of the table show that most of the household heads in the study area were male. Andaleeb (2017) has also analyzed the data concerned. According to Ali et al. (2022), Pakistan is a male-dominated society, and most family decisions are made by men. Amin et al. (2010) also reported in their findings that the majority of household heads were male. Khan et al. (2020) also examined the relevant information and found out that most family heads were men.

Table 06: Distribution of the respondents regarding the channel used for sailing the milk daily

Channel used	Frequency	Percentage
Dhodhi	99	33.0
Neighbor	181	60.3
Both dohdhi and neighbor	12	4.0
Shop	6	2.0
Self-Consumed	2	0.7
Total	300	100.0

Table 06 states that the majority of the respondents sold their milk to their neighbors while the second highest percentage of 33.0% shows that they sold their milk to Dhodhi. 4.0% of the farmers said that they sell their milk both to Dhodhi and their neighbors. Only 2.0% of the respondents sold their milk to shops and only 0.7% of the respondents used their milk. Small farms depend on intermediaries for market access since they are not connected to formal marketing networks, which results in low profitability and the exploitation of smallholder farmers. The role of middlemen is particularly opportunistic in the absence of huge dairy companies since many small dairy farmers sell their milk to these middlemen at low rates. Small herd size, distance from urban areas, lack of budget and awareness, and lack of bargaining and coordination are the main constraints that force small dairy farmers to sell their milk to these opportunistic middlemen instead of urban areas (Munawar et al., 2013; Ziad et al.., 2019).

Table 07: Distribution of the respondents regarding gender roles in livestock activities

Livestock Activities	Male	%	Female	%	Both	%
Fodder carrying	103	34.3	130	43.3	67	22.3
Fodder cutting	72	24.0	127	42.3	101	33.7
Feeding	57	19.0	192	64.0	51	17.0
Watering	43	14.3	203	67.7	54	18.0
Cleaning shed	37	12.3	178	59.3	85	28.3
Dung collection	41	13.7	216	72.0	43	14.3
Dung cakes	44	14.7	190	63.3	66	22.0
Milking	69	23.0	178	59.3	53	17.7
Milk processing	75	25.0	190	63.3	35	11.7
Marketing of animal produce	227	75.7	32	10.7	41	13.7
Marketing of animal	215	71.7	38	12.7	47	15.7
Bringing dry fodder	196	65.3	55	18.3	49	16.3
Bathing of animals	104	34.7	75	25.0	121	40.3
Cleaning of utensils used for milking	25	8.3	208	69.3	67	22.3
Health care of animals	202	67.3	41	13.7	57	19.0
Selling of milk	96	32.0	150	50.0	54	18.0
Total	**1606**		**2203**		**991**	
Mean	**100.4**	**33.5**	**137.7**	**45.7**	**61.9**	**20.6**

Conclusions drawn from the data showed that female farmers commonly engaged in indoor activities, such as feeding, cutting fodder, watering animals, maintenance of sheds, waste collection and making dung cakes, milking, milk processing for making goods, and animal bathing (Ullah et al., 2021; Manzoor et al., 2018; Akhtar et al., 2008; Arshad et al., 2013; Andaleeb, 2017; Luqman et al., 2006; Saghir et al., 2005).

The data shows that men are mostly involved in outdoor activities such as animal marketing (71.7%), dry fodder fetching (65.3%), and animal health care (67.3%), while these activities participation of women is lower than that of men. However, a high percentage (40.3%) indicates that both males and females were involved in the animal bathing activity**.** The averages and percentages in the above table make it very evident that more women than males participate in livestock management activities. Similar findings were found by Andaleeb (2017) & Amin et al. (2010), who both concluded that female engagement in animal husbandry operations is higher than male participation.

Table 08: Distribution of farmers regarding nudge 1 switch on light 5-8 pm (evening) for 30 days for animals

Farmer (F)	Minimum (Kg)	Maximum (Kg)	Mean (Kg)	Std.Deviation	Increase (Kg)
F1	52.00	55.00	54.13	0.93	3
F2	51.00	54.00	52.63	0.85	3
F3	50.00	55.00	52.63	1.47	5
F4	50.00	53.00	50.96	8.72	3
F5	51.00	54.00	52.80	1.06	3
F6	47.00	47.00	47.00	0.00	No increase
F7	49.00	49.00	49.00	0.00	No increase
F8	40.00	40.00	40.00	0.00	No increase
F9	51.00	53.00	51.23	0.56	3
F10	52.00	53.00	52.36	0.49	1

The results of the research are shown in Table 08 on milk production of dairy animals before and after nudging. A one-day session was given to ten farmers on its effectiveness before nudging. Nudge1 is applied to ten farmers for thirty days. 5 out of 10 farmers were selected to be mobilized daily to nudge their animals for 30 days. Five farmers were not mobilized daily to use nudging on their animals. A study of the milk production of animals daily after one month showed that the milk production further increased in farmers motivated to use daily nudging. Farmers who were encouraged to use nudges to increase milk production increased their milk production by 3 to 5 kg per day. Farmers who did not exercise daily had lower milk production than those who exercised daily. Only seven out of ten farmers who applied nudge to their animals daily increased milk production more than farmers who did not apply nudges.

Day and night light is very important for animals because some animals are pregnant and can give birth at night. The location of the shed should be east to west as it helps the milking animals to get direct sunlight in the morning and evening. The height of the animal shed is very important to maintain good health and protect the animals from heat. Cross ventilation is also important for increasing the milk production of dairy animals. The solar system of light also helps in reducing the electricity bill. Dairy women farmers were also trained on the above-discussed points to increase the productivity of dairy animals.

Table 09: Distribution of farmers regarding nudge 2 open animals for 24 hrs for 30 days

Farmer (F)	Minimum (Kg)	Maximum (Kg)	Mean (Kg)	Std.Deviation	Increase (Kg)
F1	50.00	52.00	51.80	0.48	2
F2	52.00	54.00	53.73	0.58	2
F3	50.00	53.00	52.36	0.85	3
F4	51.00	53.00	52.66	0.60	2
F5	52.00	55.00	54.43	0.89	3
F6	50.00	50.00	50.00	0.00	No increase
F7	50.00	50.00	50.00	0.00	No increase
F8	51.00	51.00	51.00	0.00	No increase
F9	50.00	52.00	51.73	0.58	2
F10	52.00	52.00	52.00	0.00	No increase

Table 09 shows the results for animals opened 24 hours a day for 30 days. Ten farmers were given one-day training on Nudge 6 to increase the milk production of dairy animals. After one month of daily reading of milk production of dairy animals, it was shown that the majority of the respondents claimed that their milk production increased by 2 to 3 kg due to the use of nudging. Allowing the animals to roam and breathe in an open environment helped dairy animals

increase their productivity and alleviate the pain of confinement. This nudge helped dairy animals obtain vitamin D directly from the sun to maintain good health.

Table 10: Paired sample T-Test before and after nudging on dairy animals

Nudges	t-value	df	95 percent confidence	P-value	Mean of the differences
Nudge 1 (before –after milk production)	2.8749	9	0.319-2.680	0.018	1.5
Nudge 2 (before –after milk production)	3.5	9	0.495-2.304	0.006	1.4

Paired-t-test results are reported in Table 10. Paired-t-test analysis on two nudges showed that all nudges have a significant effect on increasing the milk yield of dairy animals. This will help the respondents to improve their livelihood in the future.

The data in Table 10 shows that all the farmers were trained on the importance and use of nudges. All farmers were aware of its benefits while only 13 (65%) of them adopted it. The table results show that only 35% of the respondents have not adopted nudges. The majority of the respondents adopted the suggestions given in the training session to increase milk production and family income. The mere skilling of dairy farmers is not enough. We must consider the power dynamics at the household and community level that affect their meaningful participation in the labor market. Nudging is a trickle-down approach that will influence many other women for their future gains and profits. Lades (2014) stated that behavioral economics uses nudging tools to influence human behavior and understand what drives human behavior. It involves changing the environment in which decisions are made, usually through differences in the way choice opportunities are presented. Essential features of human decision-making help stabilize decisions and help individuals behave in their self-interest without compromising their freedom of choice.

4. Conclusion and Recommendation

This study described the effect of nudging on the development and empowerment of dairy women farmers in the informal dairy value chains. Rearing dairy animals provides many benefits to women dairy workers such as income, food, and social security in times of need. It is concluded that the contribution of women in the dairy value chain is very vital but many constraints affect the growth of women in the dairy sector. Illiteracy, absence of adequate technical knowledge regarding dairy animal husbandry, low socio-economic background, and lack of access to credit are the main constraints affecting the productivity of women dairy workers in dairy value chains. Based on the finding it is concluded that Nudging is a trickle-down approach to empowering women and helps to increase the productivity of dairy animals. We can get maximum profit from nudging within limited resources. Government policy should acknowledge the value of women's engagement in dairy-producing operations. NGOs should be involved to encourage rural women to take training sessions on nudging and use these nudges on their dairy animals to increase their dairy productivity. Access to credit will provide them with more empowerment.

Novelty Statement

The current study is one of the few studies in the field of sociology which empirically investigates the contribution of rural women to livestock management activities and household income. This research pioneers the idea of nudging in livestock management.

Author's Contribution

This paper is part of the first author's Ph.D. dissertation; the second author is her major supervisor; and the third author member of a supervisory committee. Dr. Aneela Afzal and Dr. Kashif Ishaq helped in the analysis, interpretation of data, and application of the statistical test.

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Conflict of interest

There is no conflict of interest in the manuscript.

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