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Research Article

Pig raising practices by unprivileged, ethnic people in Bangladesh

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Abstract

We interviewed 207 pig raisers from seven different districts of Bangladesh to explore their practices related to their pig farming. We used structured questionnaires to interview the pig raisers and used descriptive statistics for analysis. Most of the pig raisers (54%) were illiterate. 50% (104) of them had a monthly income of less than 10000 BDT and 60% (124) were landless. Most of the pig raisers (92%, 191) were rearing local breed and 67% of them were practicing semi-scavenging system. As feed source 55% (114) pig owners used kitchen waste and 54% (111) used rice husk. The pig raisers mentioned different types of challenges such as social problem (16%), disease (50%), less profitable (20%) and unavailability of feed (19%). In our study, we found that 31% respondents visited veterinarians, 28% visited quack and 21% do not take any action when their pigs were sick. Only 16% pig raisers used vaccines against different infectious diseases and 36% used anthelmintics against parasitic diseases. Awareness buildup of the pig raisers may help them raising pigs in a better way which will improve the farming system and reduce the probability of disease transmission.

More Information

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Introduction

Pigs are highly prolific animals compared to other farm animals [1]. Genetically pigs are two times more efficient than ruminants in converting feed to meat [2]. Pork is considered as the richest animal protein source. But pig production in Bangladesh is influenced by cultural and religious beliefs or taboos. As a result, only non-Muslim minority people raise pigs in Bangladesh. The estimated pig population reared in the household of Bangladesh is 326,000 which are raised by Christians, ethnic people, lower caste Hindus/sweepers [3]. Bangladesh's minority ethnic population is 2% of the total and they inhabit in both plain lands and hilly areas [4,5] and markedly different interms of social, cultural and development status from majority group, the "Bengali" [6,7]. At present, there are about 3.5 to 5.5 million sweepers in 63 different districts of Bangladesh are ultra-poor with limited access to health, education and employment opportunities.

In Bangladesh, pigs are mostly reared in semi-scavenging system to maximize the output by employing minimum inputs such as feed, medication, time and effort but increases the interaction among pigs, environment and humans, and favors the transmission of different zoonotic diseases through direct contact or environmental contamination [8]. In Bangladesh, pigs were detected as a host of different viral, bacterial and parasitic diseases [9-15]. Several management issues such as feeding, breeding, disease prevalence, marketing and constraints of pig production are not well reported from Bangladesh. An earlier study has reported that balanced feed was not supplied to pigs, veterinary service was not available in most cases, piglets died frequently and and pigs were suffering from different diseases [16].

We conducted this study to better understand the management system of pigs in Bangladesh. In addition, our data might be useful for future research and developing intervention in this sector.

Materials and methods

We conducted this study in seven districts of Bangladesh: Rangamati, Dinajpur, Rajshahi, Mymensingh, Meherpur, Kishorgonj and Natore (Figure 1). We purposively selected these sites for the convenience of the study to understand pig raising practices both on hilly areas and plain lands and by pig raisers of different ethnic group. We assumed 85% pig raisers would provide houses to their pigs [17]. Considering 95% confidence interval, 85% expected prevalence and 5% precision our calculated sample size is 196 pig raisers. In Rangamati, Dinajpur and Rajshahi pig raisers were tribal people and in rest of the places pig raisers were lower caste Hindus. Rangamati located at the southern part of Bangladesh and is a hilly area. Rest of the places are plain land and geographically identical. We used structured questionnaires to interview the pig raisers. Variable investigated included demographic information of pig owners, number of pigs by households, management practices, source of feed and water, cost of feed per pig, signs of disease of pigs and other livestock owned by the pig owners. For the convenience of the analysis we grouped all the respondents' udder two groups: tribal community and sweeper colony. Descriptive statistics such as percentages and frequency tables were prepared from the data generated. Chi-square test was used to test the significance of the associations between different parameters, and were applicable Fishers exact test was used.

Results

We interviewed a total of 207 pig raisers from was from Rangamati district (64, 31%), Dinajpur district (45, 22%), Mymensingh district (32, 15%), Rajshahi district (25, 12%), Natore district (22, 11%), Kishorgonj district (11, 5%) and Meherpur district (8, 4%). We grouped the respondents from Rangamati, Dinajpur and Rajshahi under tribal community (119) and respondents from Mymensingh, Meherpur, Kishorgoj and Natroe under sweeper colony (88). Most of the pig raisers enrolled in this study were Hindus (58%) followed by Buddhist (28%), Sonaton (17%) and Christians (6%). Most of the pig raising family (54%) had 5-8 (Median 5) family members. Most of the pig raisers (54%) were illiterate and 43% had education below SSC (Secondary School Certificate; grade X) level. Among our interviewee 57% (119) were from tribal community and 43% (88) from sweeper colony. Median age of the pig raisers was 37 years. We found various types of profession among the pig raisers: 41% (85) were daily wager and 22% (41) were involved in agriculture, and 50% (104) of them had a monthly income of less than 118 USD and 36% had less than 59 USD. Most of them (60%, 124) were landless and 22% (46) of them owned land ranged from 1-20 decimal (Table 1).

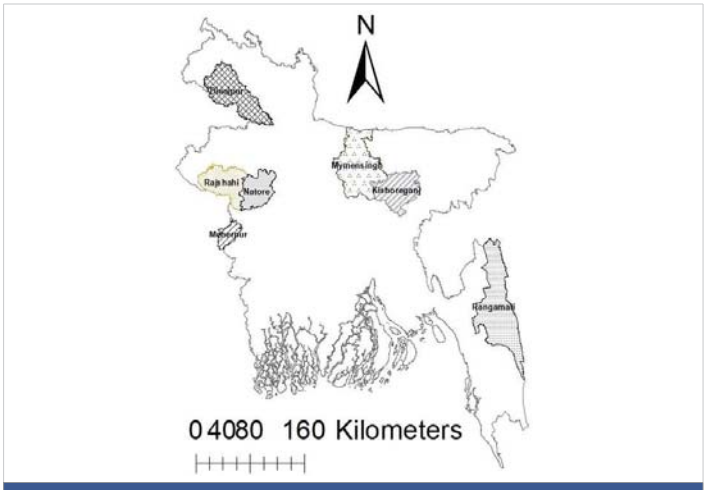

Figure 1: Study sites: showing six districts in different parts of Bangladesh.

Most of the pig raisers from both tribal community and sweeper colony (92%, 191) were rearing local breed (P<0.001). Semi-scavenging system (p < 0.001) was practiced

Table 1: Demographic parameters of pig farmers surveyed in different districts of Bangladesh.

Parameters		Numbers (207)	%
Districts	Rangamati	64	31
	Mymensingh	32	15
	Meherpur	8	4
	Dinajpur	45	22
	Kishorgonj	11	5
	Rajshahi	25	12
	Natore	22	11
Age	15-25	35	17
	25-35	68	33
	35-45	43	21
	45-55	39	19
	55-65	17	8
	65 >	5	2
	Median	37	
Religion	Hindu	120	58
	Christians	13	6
	Buddhist	57	28
	Sonaton	17	8
Family members	1-4	77	37
	5-8	111	54
	9-16	19	9
	Median	5	
Education level	Illiterate	111	54
	Below SSC	88	43
	Below HSC	6	3
	University	2	1
Community	Tribal community	119	57
	Sweeper colony	88	43
Profession	Agriculture	45	22
	Daily wager	85	41
	Businessman	23	11
	Sweeper	32	15
	Private job	9	4
	Other	13	6
Monthly income	Less than 59 USD*	75	36
	Less than 118 USD	104	50
	Less than 235 USD	25	12
	No answer	3	2
Size of land (decimal)	0	124	60
	1-20	46	22
	21-40	1	0.50
	41-60	1	0.50
	61 and above	35	17

*USD: United States Dollars, 1 Dollar: 85 Taka

by the most of the respondents from both communities (139, 67%). Purpose of raising pigs differed $p < 0.05$) and 71% (147) pig raisers were keeping pigs for business and own consumption, and 21% only for business. Very few respondents (8, 4%) received training ($p < 0.05$) on pig raising. Different members of the family were involved in taking care of the pigs ($p < 0.001$) and in most cases (65%, 134) all family members were involved in talking care of the pigs followed by wives (22%, 45) and husbands (9%, 18). Spending time for taking care of pigs varied ($p < 0.001$) and 40% (83) pig raisers were spending two hours for taking care of the pigs, followed by 28% (57) for one hour and 33% (67) for three hours or more. Most (177, 86%) pig raisers mentioned that they provide houses ($p < 0.002$) for the pigs which were very close to their own house. Pig raisers from both community used different materials for making houses for pig ($p < 0.001$) and most of them (49%, 102) used bamboo to make shelter for pigs where as 16% (34) each used brick and mud respectively. In our study, 78% (161) respondents did not do anything about the pig excreta ($p < 0.001$), whereas 13% (26) either buried the excreta or used it as fertilizer. Most (92%, 191) of the pig raisers bought and collected feed for their pigs. Most (93%, 192) of the pig raisers were providing feed to their pigs three times a day. As feed cost, most of the pig raisers from both communities (92%, 191) pig raisers were spending 0.01-0.59 USD/pig/day and 6% (12) were spending > 0.58 USD/pig/day ($p < 0.001$). As feed source 55% (114) pig owners used kitchen waste ($p < 0.001$), 54% (111) used rice husk ($p < 0.001$), 54% (101) used wheat ($p < 0.001$), rice and maize bran ($p < 0.001$), 45% (94) used rice ($p < 0.001$), 35% (73) used arum ($p < 0.001$) and 28% used local wine ($p < 0.001$). Pig raisers used different types of water sources for their pigs ($p < 0.001$) and more than half of them (57%, 119) used tube well, 20% (41) used river and 18% (37) used pond. We recorded that 71% (146) farmers killed pig ($p < 0.001$) anytime of the year where as 19% (61) only during festival. Method of killing pig also varied ($p < 0.001$): 41% used spear through the heart to kill the pigs, 34% separated the head directly and 22% stroke at the head. 85% pig raisers mentioned that they comsume raw blood of pigs (Table 2).

Sources of piglets were different for both communities ($p < 0.001$): 33% (68) pig raisers bred their pigs and 56% respondents were collecting piglets from markets, 20% from neighbors and 17% from middlemen. In most cases (86, 42%) the price ($p < 0.001$) of piglets was 12-24 USD. We observed that 81% (167) pig raisers kept 1-4 boars, 56% (115) kept 1-4 sows and 26% kept 1-4 piglets. We found that 87% pig owners sell adult pigs ($p < 0.001$) and price ($p < 0.05$) varied from 59-176 USD (Table 3).

The pig raisers from both communities mentioned different types of challenges such as social problem (16%, $p < 0.05$), disease (50%, $p < 0.01$), less profitable (20%, $p < 0.001$) and unavailability of feed (19%) (Table 4). In our study, we found that 31% respondents visited veterinarians, 28% visited quack and 21% do not take any action when their pigs were sick. Only 16% pig raisers used vaccines against different infectious diseases and 36% used anthelmintics against parasitic diseases. Pig raisers informed that most of the diseases occur during summer and rainy season (Table 5). During our studies, 85% respondents reported different signs of illness among their pigs. 46% reported anorexia, 28% reported gastrointestinal disorders, 28% reported fever, 27% reported respiratory distress, 12% reported swollen jaw, 12% reported inflamed hoof, 11% reported sudden death and 5% reported joint ill (Figure 2). We found that 29% pig raisers had goats, 29% had chickens, 22% had cows, 7% had ducks and 6% had dogs (Figure 3).

Discussion

None of the respondents, unlike other countries, took pig raising as only source of their income; rather pig raising was their additional way of earning. Lack of land and poverty could be the reasons behind this. Similar practice was observed in Phillipines and Ehiopia [18,19]. More than half of the pig raisers were illiterate. Such poor literacy level limited their opportunity to obtain a job in private or government offices. As a result, all of them were involved in different low income jobs, conforming to the observations reported worldwide including Bangladesh [18,20]. Illiteracy is one of the constrains of pig industry since studies have shown that educated pig raisers can make more profit than the uneducated ones [21,22]. Two third of the pig raisers were landless. As a result, these landless pig raisers face vulnerability of livelihood and economic opportunities which force them to engage in different low income jobs, and lead very substandard life in terms of food, housing, education and health facilities and exactly similar situations have been reported from earlier studies [16,20,23], indicating there receding, traditional and stagnant livelihood .

We have seen that almost all the pig raisers were raising local breed mostly in semi-scavenging system. Indigenous pigs are more disease resistant, produce more tasty meat, and have a satisfactory survival rate [23,24]. In semi-scavenging system the owner provide a partial feed and the pigs search for the rest from the environment. This system was practiced obviously due to lower supply of inputs or to maximize the profit margin, and such type of orthodox system of pig rearing had also been reported in an earlier study from Bangladesh [8], clearly indicating no or very minimum improvement in their knowledge about modern and sophisticated pig farming. Furthermore, these types of rearing systems have significant public health importance. Poor housing with open defecation and presence of free range pigs were identified as risk factors for transmission of *Taenia solium*-taeniasis to pig raisers from different countries [25-28]. The family members took care of pigs probably due to their poverty, small farm size and to make more profit. Raising pigs by the family members was observed by earlier researchers from Bangladesh [8,23], suggesting that they are equally at risk to the pig-borne deadly

diseases. Pigs can remain as reservoir for zoonotic influenza virus like H3N2 and H1N1 long time, which can later infect humans [29,30]. Pig houses were closely located to the houses of the owners, conforming to the pig housing reported from India and Nepal [25,26]. Pig houses were made by different locally available materials which were also observed in other countries including Bangladesh before [16,31-33]. Most of the pig raisers were not disposing off the excreta in a specific place. A previous study from Bangladesh has reported the similar observation where pig raisers were unconcerned and did not take any action for proper disposal of the waste [8]. Most of the pig raisers were providing feed to their pigs three times a day. Similar type of feeding frequency was observed in other pig raising communities [31,33]. Cost of feed and type of feed varied but more than half of the pig raisers used kitchen waste as feed. The pig raisers collected kitchen waste

Table 2: Different parameters of pig management in the study area. Number and proportion are presented

Parameters		Tribal commnity	Sweeper colony	Numbers (207)	%	*p* - value
Breed	Local	102	88	191	92	0.001
	Others (Land race, Cross, Indian)	17	0	16	8	
Type of rearing	Scavenging	5	8	13	6	0.001
	Semi-scavenging	106	33	139	67	
	Intensive	8	47	55	27	
Purpose of rearing	Business	31	12	43	21	0.033
	Own consumption	1	10	11	5	
	Business and own consumption	81	66	147	71	
	Others	4	0	4	2	
Training	Yes	8	0	8	4	0.022
Caretaker	Husband	5	13	18	9	0.001
	Wife	30	15	45	22	
	All family members	82	52	134	65	
	Others (Grand children, Children, Servent)	2	7	9	4	
Time spent for taking care	1 hour	50	7	57	28	0.001
	2 hours	58	25	83	40	
	3 hours or more	11	56	67	33	
Separate house	Yes	94	83	177	86	0.002
Material of pig house	Brick	0	34	34	16	0.001
	Mud	23	11	34	16	
	Bamboo	67	35	102	49	
	Others (brick & bamboo or brick & tin)	5	3	8	4	
Disposal of pig excreata	Nothing	111	50	161	78	0.001
	Burry or used as fertilizer	8	18	26	13	
	Thrown away	0	20	20	10	
Source of food	Buy	9	3	12	6	0.522
	Buy and collect	108	83	191	92	
	Collect	2	2	4	2	
Frequency of provided food	Twice a day	7	8	15	15	0.340
	Thrice a day	112	80	192	93	
Source of water	Tube well	68	51	119	57	0.001
	Pond	4	33	37	18	
	River	41	0	41	20	
	Others (lake and rice strach)	4	0	10	5	
Cost of food/pig/day	0 USD/pig/day*	2	3	5	2	0.001
	0.01-0.59 USD/pig/day	116	74	190	92	
	0.58 USD>/pig/day	1	11	12	6	
Types of food provided to the pigs	Kitchen waste	45	69	114	55	0.001
	Local wine	53	4	57	28	0.001
	Rice	47	47	94	45	0.050
	Wheat, rice and maize bran	47	65	112	54	0.001
	Rice husk	46	65	111	54	0.001
	Bamboo shoot	42	5	47	23	0.001
	Arum	55	18	73	35	0.001
Killing pigs for consumption	Festival	9	52	61	19	0.001
	Any time of year	110	36	146	71	
How the pigs are killed	Slaughter	6	1	7	3.4	0.001
	Spear through the heart	9	76	85	41	
	Separate the head directly	59	11	70	33	
	Strike in the head	45	0	45	21	
Consumption of pig blood	Yes	51	34	85	41	0.570
Way of consumption	With curry	51	33	84	41	0.195
	Raw with puffed rice and or curry	0	3	3	2	

*USD: United States Dollars; 1 Dollar: 85 Taka

Table 3: Breeding and selling practices of pigs in the study area. Number and proportion are presented.

Parameters		Tribal commnity	Sweeper colony	Numbers (207)	%	*p* - value
Source of piglets	Neighbour	18	23	41	20	0.001
	Middleman	30	6	36	17	
	Market	62	53	115	56	
	Scavenging herd	1	3	4	2	
	Breeding	1	2	3	1	
	Rangamati pig farm	8	0	8	4	
Price per piglet	12 USD	51	7	58	29	0.001
	12-24 USD	51	35	86	42	
	> 24 USD	9	36	45	23	
	Total			198	96	
Breeding of pigs	Yes	39	29	68	33	1.000
Number of boar in the farm	0	12	13	25	12	0.007
	1-4	104	63	167	81	
	5-8	3	9	12	6	
	9-12	0	3	3	1	
	Mean			2		
Number of sow in the farm	0	55	30	85	41	0.153
	1-4	59	56	115	56	
	5-8	3	2	5	2	
	9-12	2	0	2	1	
	Mean			1		
Number of piglets in the farm	0	61	72	133	64	0.001
	1-4	42	12	54	26	
	5-8	10	1	11	5	
	9-12	4	2	6	3	
	13-16	2	1	3	1	
	Mean			1		
Number of total pigs in the farm	1-4	83	46	129	62	0.008
	5-8	19	32	51	25	
	9-12	9	8	17	8	
	13>	8	2	10	4	
	Mean			5		
Sell adult pigs	Yes	115	66	181	87	0.001
Price per adult pig	59 USD	7	7	14	7	0.010
	59-118 USD	75	27	102	49	
	118-176 USD	11	14	25	12	
	176 USD >	2	3	5	2	

*USD: United States Dollars; 1 Dollar: 85 Taka

Table 4: Challenges of pig rearing reported by the owners in the study area. Number and proportion are presented

Parameters	Tribal community	Sweeper colony	Numbers (207)	%	*p* - value
Social problem	12	21	33	16	0.012
Disease	48	55	103	50	0.002
Not cost effective	40	2	42	20	0.001
Food unavailable	27	12	39	19	0.109

Table 5: Disease management by the pig raisers in the study area. Number and proportion are presented.

Parameters		Number	%
What is done when pig is sick	Quack	50	28
	Veterinarian	56	31
	Nothing	38	21
	Sale at cheap price	16	9
	Kill to eat	3	2
	Treated by the owner himself	4	2
Use of vaccine	Yes	29	16
Use of anthelmintic	Yes	64	36
When most of the disease occur	Summer	55	31
	Throughout the year	52	29
	Rainy	44	25
	Winter	11	6
	Winter and rainy	6	3
	Summer and winter	3	2
	Summer and rainy	2	1

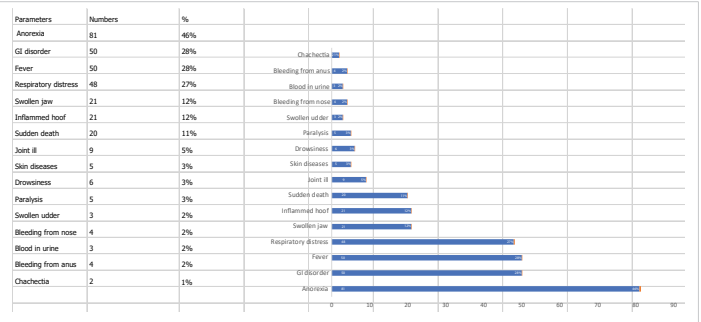

Figure 2: Different diseases reported by the owners in the study area.

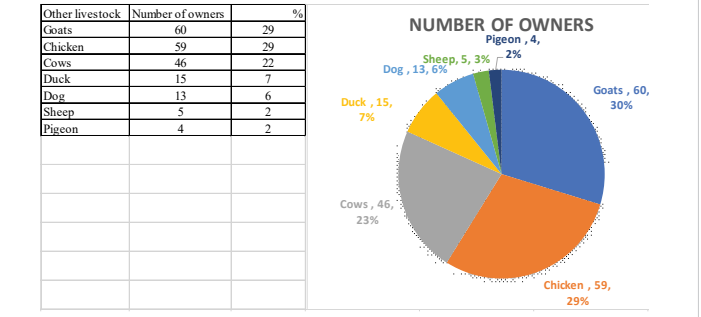

Figure 3: Other livestock owned by the study participants.

from different restaurants either for free or at a very minimal price, which is commonly practiced in Bangladesh and India [8,33]. They used kitchen waste probably due its availability and very low price. As pigs are omnivorous animals, they are able to consume the kitchen waste which is a mixed up of rice, fish, meat and vegetables [34]. As pigs are consuming feed which would otherwise be wasted, they are actually keeping the environment clean. The pig raisers fed local wine to pigs as they believed that local wine will significantly increase the growth rate of the pigs. Pig raisers were found to use brewer's by-products as feed for pigs in Ethiopia [19]. Three pig raisers mentioned that they eat raw blood with puffed rice, which is potentially dangerous as a source of communicable diseases.

Only one third of the pig raisers were breeding their pigs and the rest were conllecting piglets from different sources among which market was the major one. A previous study from Bangladesh has shown that 93.33% piglets were procured from local market [31]. Pig raisers choose markets probably due to availability of more piglets, option to choose and to get better a price. On an average there were five pigs at each farm, which indicate that pig farming in Bangladesh is mostly a small family owned industry. The contributing factors for such small scale farms could be lack of space, lack of capital, lack of food, mortality of piglets and other constrains including diseases [16].

The challenges mentioned by the pig raisers were in agreement to the findings from earlier studies [8,35]. A previous study has reported social disrespect to the pig raisers by majority Muslims as pig is regarded as unholy to the Muslim community [8]. Diseases of pigs are one of the challenges faced by the pig raisers and those signs of diseases were reported earlier [16,31,36]. Pig raisers did not take necessary steps to treat their animals. In our study, we found that only one third of them seek support from the veterinarians when their pigs were sick. Also, pig raisers were not fully aware of vaccines and anthelmintics which supports results from earlier studies [16,19,31,35]. Parasites including both ecto and endo parasites negatively affect the growth and feed efficiency of pigs. Several types of parasites of pigs has been reported from Bangladesh in the past: *Haematopinus suis*, *Boophilus microplus*, *Fasciolopsis buski*, *Gastrodiscoides hominis*, *Ascaris suum*, *Metastrongylus elongatus*, *Stephanurus dentatus, Physocephalus sexalatus* [15,37]. These parasitic disease can be treated easily with commercially available anthelmintics which will not only accelerate the growth rate of pigs, but also will minimize the risk of pig borne zoonoses [38,39]. Pigs are also infected by Foot and Mouth Disease, hemorrhagic septicemia and anthrax, which can be controlled by vaccines available in Bangladesh at a subsidized price. Pig raisers were keeping different types of animals together which is substantiated by an earlier study from Bangladesh [8] and pose the animals to the risk of communicable diseases [40,41]. Transmission of avian influenza virus from poultry to pig has been reported earlier [42-44].

Conclusion

Taken together, our study revealed that pig raisers had small farms in their backyard and reared pigs in traditional ways. Many pig raisers practiced semi-scavenging system to minimize the feed cost, which on the other hand can play role for transmitting disease from pig to humans. Additionally, lack of knowledge about proper disposal of pig excreta; close contact with pigs, co-farming, unconsciousness about proper hygiene, close housing with their own dwelling places are the main factors, so far assumed, associated with the spreading of communicable diseases. Initiative from different government and non-government organization to train and aware the pig raisers will not only increase production but also will minimize the transmission different pig-borne zoonoses, and ultimately will help the receding, ethnic, resource deprived, unprivileged segment of the population to uphold their livelihood.

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