ASSESSMENT OF KNOWLEDGE AND PRACTICES OF FOODWORKERS ON PERSONAL HYGIENE PRACTICES IN FISHERY FACTORIES IN MYANMAR

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Abstract- Personal hygiene knowledge and practices are essential parts in GMP/HACCP implementation. The objective of this study was to assess personal hygiene knowledge and food safety practices of workers in fishery factories in Myanmar. Data from 100 general workers and 44 HACCP team members from 4 certified fishery factories in Myanmar were collected by using questionnaire with face to face interviews. They were validated through on-site observation by auditors. Personal hygiene knowledge, personal hygiene practices and food safety knowledge were significantly different ($p<0.0001$*) among the four factories. Factory M received the highest mean score of both knowledge and practices of general workers. The factory's team members also obtained the highest score. Factory K was the second best in the respective evaluations. Workers of factory P had moderately good knowledge but had poor hygiene practices which may be contributed from poor knowledge of the team members/supervisors ($P<0.001$). Factory N, on the other hand, workers were poor on both knowledge and practices despite the good knowledge of team members. All factories, however, still lack of knowledge on knowledge of 14 aspects tested. In conclusion, the factories needed to improve the food safety knowledge and awareness as well as attitude of workers. Team members/leaders attitude and performance greatly affected on knowledge and practices of workers in GMP/HACCP implementation. Factories should also provide facilities to support good personal hygiene and good sanitation in the production area as well.

Keywords- Fishery Factories, Food Workers, Food Safety Knowledge,Personal Hygiene Knowledge,Personal Hygiene Practices.

I. INTRODUCTION

Asian region is one of the major suppliersof fishery products in the world market. The current conditions of export fishery markets in Japan and EU countries have expected that implementation of food safety system or EU certification applied or certified in fisheries exporting factories. Hazards Analysis Critical Control Point (HACCP) is well recognized as international food safety system and also a legal obligation in many developing countries. The system is well supported by Good Manufacturing Practices (GMP) as foundation. GMP is essential in preventing cross contamination to food and requires good awareness from top management to general workers in the process. The solid GMP resulted in successful implementation of HACCP.

More than 135 fishery factories in Myanmar are exporting of fishery and seafood products to EU, Japan, Singapore, and Middle East countries. However, the HACCP system has not been extensively certified in Myanmar. In total, only 14 fishery factories are approved for EU certification(Anonymous, 2013)and a very few amount of fishery factories have implemented for HACCP/FSMS international certification.

The good personal hygiene practices are a crucial role in successful implementation of GMP/HACCP in food industries. Lack of knowledge relating to food safety such as GMP/HACCP is the main barriers in

the successful food safety system implementation (Karaman et al., 2012).

Food workers are a crucial link between food and consumers and GMP/HACCP implementation. Food workers play an important role in ensuring food safety throughout the chain of food production and storage(Mayes, 1994). Mishandling and disregard of hygienic measures on the part of the food workers allow pathogenic bacteria to come into contact with food because of microbes can be found in contaminated water, on dirty hands and under nails, on hair and dirty clothing, etc. In the means time, food workers have a major role in the prevention of food contamination during food production and distribution from cross-contamination.

Most of food workers in fishery factories in Myanmar have education at low levels or not related to food safety. Poor knowledge in food safety and personal hygiene may impact safety management in the factory. Training must be properly provided to give knowledge leading to effective practices of food handling. This increase the importance of supervisor and HACCP team leader knowledge and proper control/supervise their workers.

The objective of this study was to assessknowledge and practices of food workers in theGMP/HACCP certified fishery factories in Myanmar. The knowledge and influence of team leader and supervisoron workers knowledge and practices are also investigated.

II. MATERIALS AND METHODS

2.1 Research population and data collection

One hundred (100) general workers and 44 food safety team members from 4 GMP/HACCP certified factories in Myanmar participated in this study. For personal hygiene knowledge and practices sections, interviews to general food workers from production plants were conducted. On site observations were also conducted by trained auditors to validate the implementation and conducted onsite observations in their processing areas.This study was conducted during 2014 to 2015 using questionnaire with face to face interviews of general workers and team leaders. The onsite observation was conducted by certified auditors to determine personal hygiene knowledge,and personal hygiene practices of general food workersof fishery factories in Myanmar.

2.2 Questionnaire Design

The questionnaires contained4 sections. Section 1 involved5sectors on demographic information of general food workers (sex, education level of respondents, working experiences, training times and overview on food safety system). Sections 2 and3 contained 14 sectors of total 43 questionsfocus mainly on general personal hygiene knowledge and personal hygiene practices of general workers based on the hygiene practices carried out in their working areas. Data were evaluated by interviews and onsite observation checklist (visual and verbal) of HACCP implementation. Section 4 involvedbasic food safety knowledge of food safety team members.

2.3 Statistical analysis

The statistical analysis of data was conducted by using Analysis of Variance among the four factories. Effects of their knowledge and practices on actual implementation were evaluated against results from on-site observations using level of significant, α, 0.05.

III. RESULTS AND DISCUSSION

3.1 Demographic characteristic of food workers

The demographic information related to the characteristics of general food workers employed a total 5 baseline questionnaires in total four fishery factories are demonstrated in Table – 1A total of 100general food workers involved in this study. Most employees are female 86% with 100% of middle school level. The workers have 0-5 years experienced in their current factories. All (100%) had training on personal hygiene for 1-5 times. Their perceptions on GMP/HACCP system were 43%agreed with safety of food for consumers, 30% assumed that system are good system for health and sanitation, and 27% not sureabout personal hygiene practices.

These were also 44 food safety team members for 11 from each factory. However, their demographic information was not recorded.

Table – 1 Demographic characteristic of general food workers

Characteristics	n	%
Sex		
Male	14	14
Female	86	86
Education Level		
Middle School	100	100
Training Times		
1-5 times	100	100
Experiences		
1-5 years	100	100
Overview of the system		
Safety of food for consumers	43	43
Good system for health and sanitation	30	30
Improper System	-	-
Not sure	27	27

3.2 Personal Hygiene Practices

The coefficient of predicted values from questionnaires and on-site observation scores, R^2 value,was 0.45. Itindicated a wider range of practices in the real situation where experience and fatigue may have a greater influence on their practices (Fig – 1).

The results of personal hygiene practices among four factories were shown in Fig – 2.Factory M had the highest mean scores 39.72 in rank A, while K second

with scores 37.76 in rank B. They were significantly different (P<0.05). Factories P and N had the lowest score from the others with scores of 36.10 and 35.70, respectively but they were in same rank C.

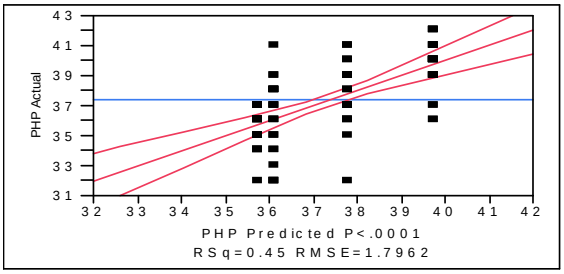


Figure – 1 Response PHP (Predicted Plot)

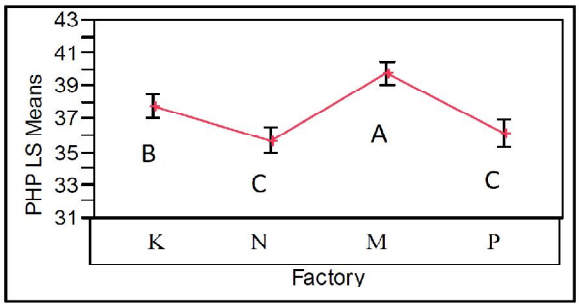


Figure – 2 Lease Square Means plot of personal hygiene practicesamong four factories, same letters indicate not significantly different (P>0.05)

In details, factory M hashigh scores in the most of sectors and also the highest of personal hygiene practices among four factories. (Fig – 3) showed different effects of factors on food hygiene scores, where 1 to 14 stand for changing room, uniform, glove, mask, apron, hairnet, finger nail, jewelry, medical check-up, hand washing, foot dipping, time-temperature perception, utensil cleaning, and reporting system (n=75). While only a few, 16% and 37.33%, of food workers in factory N and P were conducted good changing room practices, most of workers stored their box lunch in their uniform lockers that did not meet with sanitization requirements. More than 70% of food workers in four factories applied good uniform practices, though some worker's uniforms were not up to standards and all factories still need to improve in systematically keeping and cleaning system.

Glove practice was problematic among factories where the correct practice was found in factory K at 88%, N78.67%, and P, 92%. Some did not wear gloves with good condition.

The goodpractices were found in some factories with K of 84%, M 100%, P 92% and N 60%N were applied with tear and dirty aprons.

In general, factories N and P applied poorer practices compared to the other two, K and M.

Most of the food workers in four factories took good care of keeping fingernails short and clean, but some still wore jewelry (especially ear rings), K 30%, N 24%, M 46% and P 44%, and Thanakha (traditional face powder).

Medical check-up was followed in all factories except some factory workers still did not have one because of high turnover rate. Hand washing combined with gloves were adopted that could decrease the potential of cross contamination and hazards (Montville et al., 2001).

Factory workers,N 94%, and P 96%, followed foot dipping system but did not understand the control of time and temperatures in the processing and did not pay much attention to that.

Only 78% of the factories have good supervision and reporting system, most of food worker's reported their working and uncomfortable conditions and health situations to supervisors in their working areas.

3.3 Personal Hygiene Knowledge

The personal hygiene knowledge (PHK) was also diverse with moderate correlation between actual and predicted values (Fig – 4).

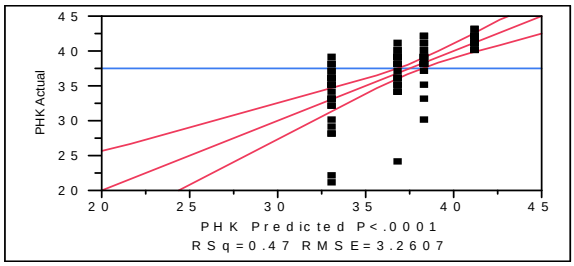


Figure – 4 Responses PHK (Predicted Plot)

The personal hygiene knowledge among the 4 factories was significantly different, P<0.0001. Ranks among of the factories were shown in Fig – 5.

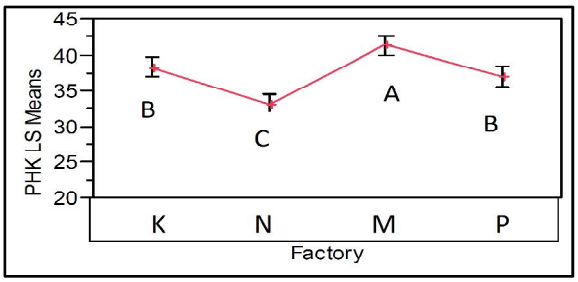


Figure – 5 LS Means Plot of food hygiene knowledge of workers among the four factories (P<.05). Levels with the same letter are not significantly different.

Overall practices, factory M had the highest mean scores of 41.28 in rank A, followed by K and P with scores 38.32, and 36.90, respectively in rank B.N had the significant lowest overall mean scores of 33.12 in rank C.

The food workers did not have good knowledge in food safety. Though, some factories have high scores in several categories but still poor in some practices (Fig – 6). For example, factory M had high scores in apron and hairnet usage but quite poor in changing room condition, uniform usage, glove and mask

usage. However, Nhad the lowest knowledge in almost all of the sectors among four factories.
They need to improve awareness and knowledge in using of protective dressing as well as practicing the food safety system. Supervisors allow workers with improper dress to work demonstrating their own lack of awareness as well.

It was found that most of food workers in four factories have medical checkup. Some know reasons of hand washing, and other practices. But a lot percentage did not. This surely cause problems in cross contamination problem due to poor application of GMP/HACCP.
Foot dipping, hand washing, especially after using toilet facilities were critical to control cross contamination to food or product (Soares et al., 2012).

The control measure of temperature is essential to reduce microbial contamination and possible growth. In this study, we found that most of food workers have aware of time, temperature performance system, particularly on monitoring the proper time and temperature in processing. However, some workers did not exactly sure about why time and temperature control involved as an essential part and how effect on the products in their working areas.

Considering utensils and surface cleaning practices, factory K have 77% and more than 90% have awareness in other 3 factories. More than 70% of food workers in four factories have acceptable knowledge in supervision and reporting system to supervisors when they found the problems in their working areas.

3.4 Food Safety Knowledge (FSK) of HACCP Team

Food safety knowledge and practices of general workers were not satisfactory. There is high percentage that had low perception of food safety practices due to lack of knowledge. This study also evaluates their 44 food safety team members and supervisor in the same knowledge and practices. It was found that mostly, they know food safety at different degree. Figure – 7demonstrated the relationship of food safety knowledge of food safety team members.

Food safety team members in factories N and M scored high while K second and P last. The food safety knowledge (FSK) of food safety team members were different among four factories (P<0.0001). The factories N and M had the highest mean scores of 57.63 and 56.72, respectively in rank A (P>0.05). Factory K was the second highest with 36.90 in rank B and P had the lowest mean scores of 21.81 in rank C in whichFig – 8demonstrated that the knowledge of team members of the 4 factories were significantly different (P<0.0001).

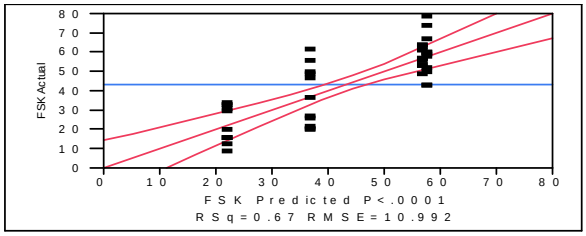


Figure – 7 Responsesfood safety knowledge (FSK) (Predicted Plot)

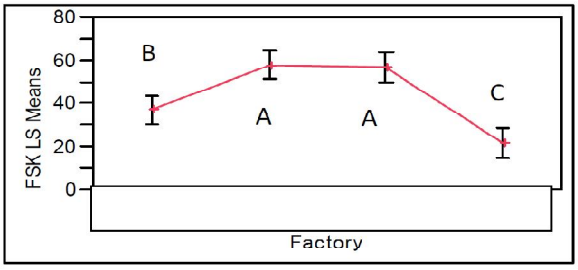


Figure – 8 Lease Square Means Plot for food safety knowledge. Same letters indicated not significantly different (P>.05).

Table – 2Relationship of food safety knowledge and practice of general workers and knowledge of team members. Same letters in each main column indicate not significantly different.

Level	Workers PHK			Workers PHP			Team FSK		
N			C			C	A		
M	A			A			A		
K		B			B			B	
P		B				C			C

3.5 Overall discussion between PHP, PHK and FSK

Most of workers in four factories knew somehow about good personal hygiene practices and knowledge for hand washing, foot dipping, medical checkup, utensils and surface cleaning system and time, temperature and performance system. But some still did not.
Table – 2indicated that workers and team members of factory M had high score in knowledge and practices. Workers had good knowledge and practice score among the four factories. Factory K also showed good relation of the knowledge and practices of workers and their team members/supervisors though they are not at the high score levels. Factory N, however, despite the good knowledge of food safety team members the knowledge and practices of workers were both poor. This implied thattraining or supervising to food workers were so deficient that workers performed poorly in practicing food safety in the factory. Therefore, we suggested that the factory should provide more training in awareness and knowledge as well as practices to their workers.
Factory P,on contrary, despite poor knowledge of the team members, some workers showed good knowledge but they did not practice well enough. This may be due to the fact that though workers had good knowledge, but if the supervisors were not

knowledgeable or did not provide good suggestions on practices, workers could pay no attention and become bad as well because of the long working hours in Myanmar deterred them from thinking of the better way to do it anyway.

This work demonstrated that training workers and team members were important but the enforcement and good supervision from their team leaders/members were also equally important. Lack of proper management of knowledge to practices could be disaster to the GMP/HACCP implementation. The workers have still practices poorly if they did not have good attitudes toward food safety (Baş et al., 2006).

Training and evaluating to make sure food workers have adequate attitude and knowledge as well as good supports from supervisors would lead to better practices of personal hygiene to support food safety system (Taylor, 2008). Wallace et al. (2005) also indicated that noncompliance of these practices and system wasmainly due to the lack of their skills or awareness of food safety.

In factory N food safety team leaders and managers should train food workers to clearly that the cause and effects of their personal hygiene practices in their working areas and what would affect products quality and safety by their wrong practices. Food workers training for personal hygiene sanitation practices are important to increase food safety knowledge and hygienic awareness (Worsfold, 1993) that potentially lead to positive hygienic practices in working areas and also increased knowledge and awareness that does not mean to change automatically to good hygiene practices (Kassa, 2001).

To create awareness and good working attitude, the basic facilities such as changing room, uniform, apron, hairnet and gloves system in all of four factories should be improved as well.The management and food safety team needed to support, supervise, and encourage to change for gloves, mask, hairnets and aprons of unacceptable conditions (Coleman et al.,2000).

CONCLUSION

In fishery factories, most of food workers are middle school level and have a barrier for food safety terms in training. The training programs are essential to improve in food safety knowledge especially in personal hygiene knowledge and practices of food workers. This study demonstrated that personal hygiene knowledge of food workers in Myanmar fishery factories was not sufficient.Training should be included the main factors of personal hygiene practices such as greater focus on safety awareness, time and temperature control, improper hygiene, risk perceptions and cross contamination in processing areas(Barrett and Howells, 2008).

GMPs and HACCPs training should also have positively impact on workers' attitude and practices (Ko, 2013). It is also vital to evaluate the effectiveness of training as proper practices in their processing areas (Griffith & Clayton, 2005; Ansari-Lari et al., 2010).

Good personal hygiene practices of a factory depend on, not only management system for resources (human, competence, training and awareness, infrastructure and work environment), from management level, but also the attitudes of food workers as well as helps from their knowledgeable supervisors.

ACKNOWLEDGEMENTS

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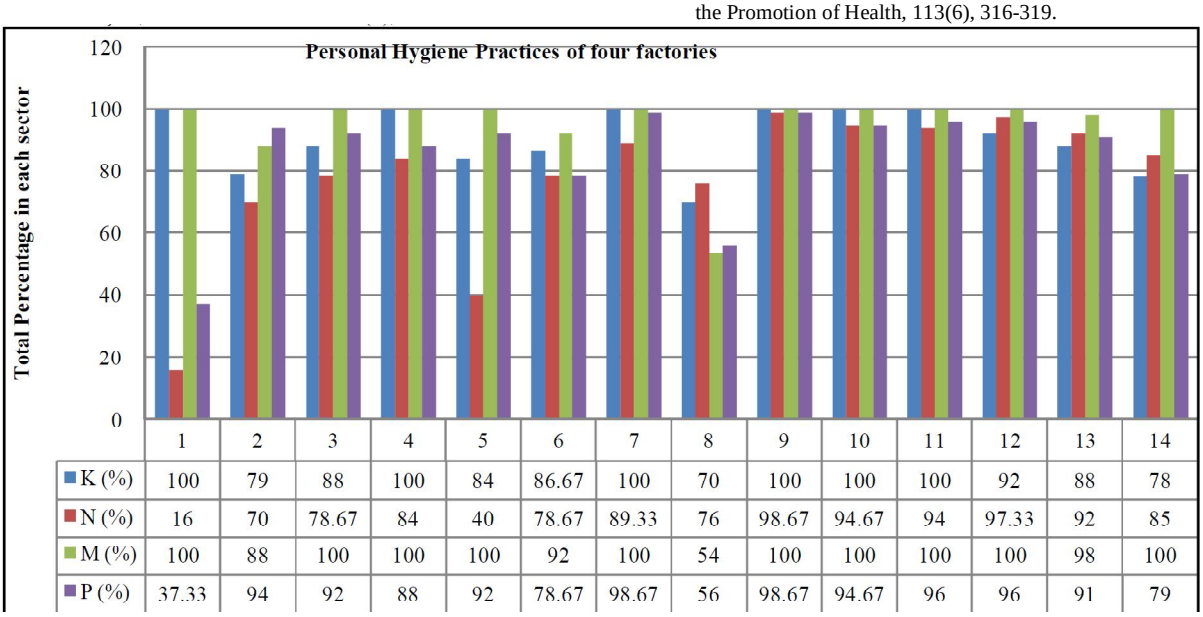
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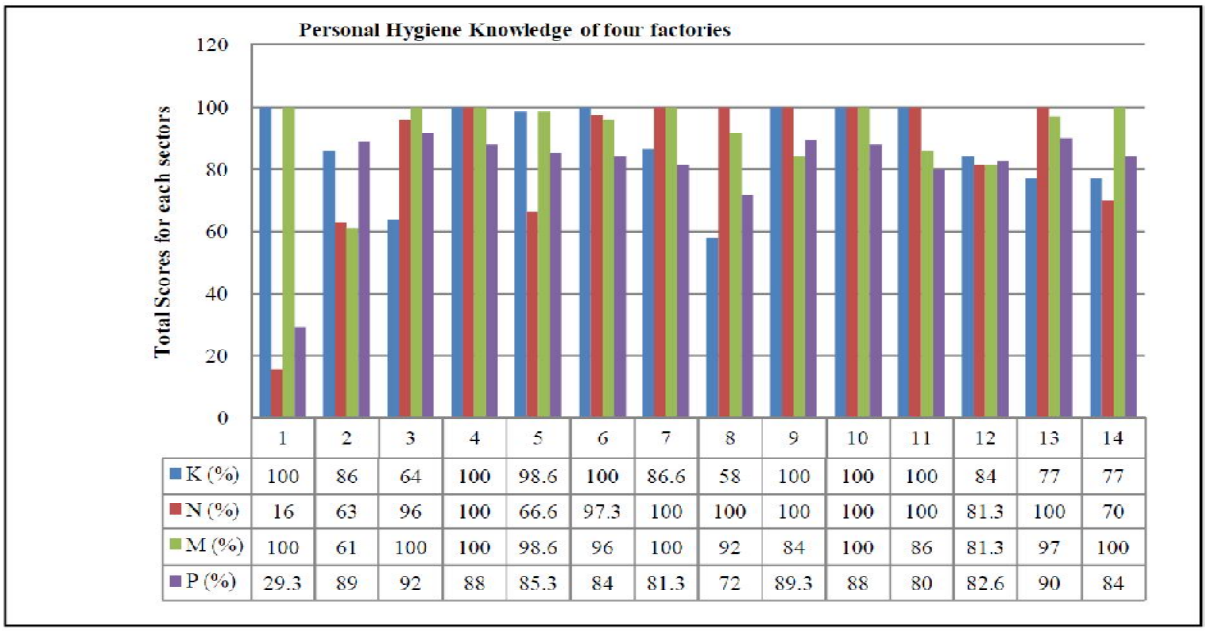
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	1	2	3	4	5	6	7	8	9	10	11	12	13	14
K (%)	100	79	88	100	84	86.67	100	70	100	100	100	92	88	78
N (%)	16	70	78.67	84	40	78.67	89.33	76	98.67	94.67	94	97.33	92	85
M (%)	100	88	100	100	100	92	100	54	100	100	100	100	98	100
P (%)	37.33	94	92	88	92	78.67	98.67	56	98.67	94.67	96	96	91	79

Figure – 3 Details difference of Personal Hygiene Practices (PHP) of four factories.



	1	2	3	4	5	6	7	8	9	10	11	12	13	14
K (%)	100	86	64	100	98.6	100	86.6	58	100	100	100	84	77	77
N (%)	16	63	96	100	66.6	97.3	100	100	100	100	100	81.3	100	70
M (%)	100	61	100	100	98.6	96	100	92	84	100	86	81.3	97	100
P (%)	29.3	89	92	88	85.3	84	81.3	72	89.3	88	80	82.6	90	84

Figure - 6 Details difference of Personal Hygiene Knowledge (PHK) among four factories (%)

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