

# Distance education in improving knowledge, attitudes and skills of public health inspectors

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## Abstract

**Background:** The duties of Public Health Inspectors (PHI) includes those related to food legislation. Effective methods are being explored in providing refresher training for them amidst the constraints of resources.

**Objective:** To assess the knowledge, attitudes and skills of the PHI on food legislation and to evaluate the effectiveness of a Distance Education (DE) programme in improving these.

**Methodology:** The study included quasi-experimental educational intervention with a pre- and post- assessments. 105 and 109 PHI were recruited for the intervention and control groups. Pre and post interventional assessments on the knowledge, attitudes, self-assessed competencies and performance were done with a self-administered questionnaire and observational checklist. Intervention group was exposed to an educational intervention through a distance education programme. Post-assessments were done following four months of the intervention.

**Results:** The pre interventional knowledge and performance was poor. PHI had unfavorable views. Post intervention mean knowledge and performance scores revealed that a statistically significant improvement ( $P < 0.001$ ) has occurred in the intervention group. Change in the opinions on usefulness of in-service training on food safety to develop knowledge and skills, was statistically significant ( $P < 0.01$ ) in the intervention group.

**Conclusion:** The DE method used in the present study was feasible to implement and was effective in significantly improving the knowledge and performance of the PHI.

**Keywords:** Distance Education, Continuing Education, Public Health Inspector, Food Legislation

## Practice Highlights

- Continues Education is important for development of knowledge and skills of healthcare staff.
- Distance Education can be successfully used for Continues Education for staff geographically scattered.

## I. INTRODUCTION

Learning is an active, continuous, sequential process. Learning takes place more rapidly when the learner has the opportunity to practice and experience what is being learned in a variety of situations. It is facilitated when it takes place in or near the real situation in which the learner expects to work (Schunk, 2012). There is an increasing recognition of the need for health workers to continue their education throughout their career (Price & Reichert, 2017). The changes that take place in health

needs and health care policies necessitate continued learning.

Continuing education (CE) should be an integral part of an employment. Adequate provision should therefore be made for it in terms of manpower, study level and financial reimbursement. Whenever possible, CE must be provided at the place of work and must be relevant to the immediate needs of the health care workers and the community he/she serves (Billett et al, 2015; Cedefop,

2015; Kenny, Ralph & Brown, 2006; Sherman & Chappell, 2018).

Professional and technical education with traditional methods of training are often inflexible, time- and place-constrained and too expensive to meet the demand for training (Asian Development Bank, 2014; Scott, 2010). Efforts like technological advancements and distance education techniques have created an immense impact in molding the education methods (Chay, 2019). Distance education (DE) seems to offer a way of providing flexible, effective job-related training.

To be successful, DE programme must be systematically designed, interactively motivational and suited to the needs of the audience (Balaban-Sali, 2008). Distance education has the potential of delivering more educational opportunities to more people than ever before, at lower average cost and most importantly, at a higher quality than most people can get in other ways (Marcinkiewicz, Cybart & Chrominska-Szosland, 2002).

The problem of updating the knowledge and skills of health personnel already on the job still remains as a challenge (Murray & Christison, 2018). It is almost impossible to have them re-trained at the institutions they occupy with face-to-face contact with the physical presence of trainers. Hence it is important to develop novel programmes in updating and refreshing of the health personnel amidst the feasibility constraints.

Food borne diseases account for a major toll on health. According to the World Health Organization (WHO), up to one-third of the populations of developed countries are affected by foodborne illnesses and the problem is likely to be far widespread in developing countries (World Health Organisation, 2002). The administration and implementation of food laws requires a qualified, trained, and efficient food inspection service (Food and Agriculture Organization of UN & WHO, 2003; Sri Lanka Accreditation Board for Conformity Assessment, 2013). Hence, proper training of food inspectors (PHI) is a prerequisite for an efficient food control system.

The need of providing training to PHI to improve their performance has been identified in the National Health Development Plan (NHDP) of Sri Lanka (Ministry of Health Sri Lanka, 2016). Public Health Inspector is one of the main authorised officers to implement public health laws in Sri Lanka. Of their many duties, PHI play a major role in maintaining food safety in the community. In addition, the food legislation is one area where major responsibility in implementation lies with the health sector. Therefore, educational interventions to

improve the implementation could be carried out successfully as a part and parcel of the NHDP of Sri Lanka.

This study was done to assess the knowledge, attitudes and skills of the PHI on food legislation and to evaluate the effectiveness of a DE programme in improving these.

## METHODS

### *A. Study Design*

The study consisted of 3 components; Pre-interventional assessment, a quasi-experimentation and a post-interventional assessment. In the pre- and post-tests assessment of knowledge, attitudes, self-assessment of competencies (SAC) and observation of performance of PHI on implementation of legislation on food safety was carried out.

### *B. Study Setting*

The study was conducted in Gampaha and Kurunegala districts. Range PHI (PHI serving in an allocated PHI range in a MOH area) serving in these districts were selected as the study population. PHI performing duties of specialized campaigns were excluded as they do not carry out activities on food safety. In allocating PHI to the intervention and control groups, all PHI in a single district were allocated to either the intervention or the control group. Random allocation within a district was not possible in this educational intervention as cross-contamination would have occurred if PHI serving in the same area or adjacent areas were included in both the intervention and control groups. Assessment of knowledge, self-assessment of competencies and attitudes were carried out in all the PHI in both groups. However, the performance was assessed in a sub-sample of 25% of PHI in each group due to feasibility-related practical constraints.

### *C. Study Instruments*

Self-administered questionnaires were used for the assessment of knowledge, attitudes and SAC. Performances were assessed by direct observation in the field and the office settings using check lists. The questionnaires and checklist were developed using Delphi Technique with the participation of Public Health Specialists, Medical Officers of Health, Food & Drugs Inspectors and Public Health Tutors. Knowledge questionnaire had 15 short answer question with a maximum score of 50 marks. Attitude questionnaire had 15 5-point Likert Scale statements and SAC questionnaire had 15 statements with a 4-point rating scale ranging from very competent to cannot perform. Three checklists were for assessment of food handling establishments, food sampling and record keeping in the

PHI office. Checklists were administered by the principal investigator. Following the pre-interventional assessment the intervention group was exposed to a distance education programme using distance education modules. The control group was not exposed to this educational programme.

#### D. Training Needs Assessment

A Training Needs Assessment followed by selection of study topics, development of the curriculum and development of course materials were carried out in preparation of the three distance education modules. Through the training needs-assessment the specific training needs in the poorly performed areas of the pre-test were identified. Topics that were to be incorporated in the distance education modules were selected using the Nominal Group Technique. The topics selected for the three modules were; “1.Legislation on food safety”, “2.Food sampling, Inspection and rating of food establishments and maintenance of records in food safety” and “3.Legal procedures in food safety”.

#### E. Distance Education Programme

The DE programme was conducted using the printed media. Three DE modules were distributed at monthly interval for three months. Each module contained a tutorial and the participants were requested to answer after studying the entire module. The questions were based on subject matter covered by all the lessons in the module.

Post intervention assessment was conducted after a lapse of four months of administering the final module. The tools used for this assessment i.e. questionnaires and checklists, were identical to those used in the pre intervention assessment.

### III. RESULTS

There were 105 PHI in the intervention group and 109 in the control group.

| Component                 | Intervention Group |      | Significance | Control Group |      | Significance |
|---------------------------|--------------------|------|--------------|---------------|------|--------------|
|                           | Pre                | Post |              | Pre           | Post |              |
|                           | Mean               | Mean |              | Mean          | Mean |              |
| Enactments on food safety | 29.4               | 61.3 | P < 0.001    | 30.6          | 32.1 | NS           |
| Food labelling            | 52.4               | 68.1 | P < 0.001    | 54.2          | 56.4 | NS           |
| Food sampling             | 24.0               | 63.4 | P < 0.001    | 24.9          | 26.8 | NS           |
| Meat and fish inspection  | 54.4               | 67.6 | P < 0.001    | 53.6          | 55.6 | NS           |
| Legal procedures          | 40.3               | 67.8 | P < 0.001    | 41.4          | 43.5 | NS           |

Table 1. Comparison of PHI in the intervention and control groups by mean scores of the knowledge assessment before and after the intervention

| Component                 | Intervention Group                          | Control Group                               | Significance |
|---------------------------|---|---|--------------|
|                           | Difference between post and pre mean scores | Difference between post and pre mean scores |              |
| Enactments on food safety | +31.9                                       | +1.5  | P< 0.001     |
| Food labelling            | +15.7                                       | +2.2  | P< 0.001     |
| Food sampling             | +39.4                                       | +1.9  | P< 0.001     |
| Meat and fish inspection  | +13.2                                       | +2.0  | P< 0.001     |
| Legal procedures          | +27.5                                       | +2.1  | P< 0.001     |

Table 2. Comparison of the changes in the mean scores of the knowledge assessment between the intervention and control groups

#### A. Knowledge

In comparison of the pre and post intervention knowledge scores, PHI in the intervention group has shown statistically significant (P<0.001) improvements in all components. Control group failed to achieve a significant improvement (Table 1).

In the intervention group highest change was seen in the knowledge on ‘food sampling’ (+39.4 marks) and was closely followed by ‘enactments in food safety’ (+31.9 marks). The difference of scores between the two groups achieved a statistical significance at P < 0.001 (Table 2).

### B. Attitudes

Except for the change in the attitudes on usefulness of in-service training to develop knowledge and skills where there was a 25.4% increase in the number of PHI of the intervention group who agreed with this statement and showed a statistically significant difference ( $P < 0.01$ ), there was no other significant changes of the attitudes of PHI in both groups (refer Appendix A, Supplementary Table 1).

### C. Self assessed competencies

At both pre and post tests a high proportion of the PHI in both groups rated themselves either ‘very competent’ or ‘competent’ in performing activities. Only a minority indicated that they cannot perform the listed activities. The only deviation of this pattern was seen in the intervention group in two activities, “correctly identifying the legislation in which different violations of

food safety be prosecuted” and “performing court procedures in court cases in food safety” where an increase of 16.6% and 25.4% respectively was seen from the pre intervention value, which were statistically significant (refer Appendix B, Supplementary Table 2).

### D. Performance

In comparison of the mean performance scores obtained in the pre and post intervention assessments the intervention group showed a significant increase ( $P < 0.001$ ) at the post-intervention assessment in all 3 activities: inspection and categorization of food establishments, food sampling and documentation and maintenance of records. In the control group there was a marginal increase in the mean scores at the post intervention assessment and was not statistically significant (Table 3).

| Component  | Intervention Group |              | Significance | Control Group |              | Significance |
|--|--------------------|--------------|--------------|---------------|--------------|--------------|
|  | Pre<br>n=30        | Post<br>n=30 |              | Pre<br>n=30   | Post<br>n=30 |              |
|  | Mean               | Mean         |              | Mean          | Mean         |              |
| Inspection and categorization of food establishments | 40.1               | 69.3         | $P < 0.001$  | 42.2          | 44.1         | NS           |
| Food sampling  | 50.7               | 70.9         | $P < 0.001$  | 53.5          | 55.1         | NS           |
| Planning, documentation and maintenance of records   | 29.8               | 47.3         | $P < 0.001$  | 31.2          | 32.9         | NS           |

Table 3. Comparison of mean performance scores before and after intervention

The difference of the pre and post mean performance scores of the intervention and control group showed that the changes in the mean performance scores were

marginal in the control group in comparison to the changes of the intervention group (Table 4). The difference of scores between the two groups achieved a statistical significance ( $P < 0.001$ ).

| Component  | Intervention Group                    | Control Group                         | Significance |
|--|---------------------------------------|---------------------------------------|--------------|
|  | Difference between post and pre means | Difference between post and pre means |              |
| Inspection and categorization of food establishments | +29.2                                 | +1.9                                  | $P < 0.001$  |
| Food sampling  | +20.2                                 | +1.6                                  | $P < 0.001$  |
| Planning, documentation and maintenance of records   | +17.5                                 | +1.7                                  | $P < 0.001$  |

Table 4. Comparison of the changes in mean performance scores between the intervention and control groups

## IV. DISCUSSION

This is the first documented local study testing a DE method for improving the knowledge, attitude and skills of PHI on food legislation. CE is a process, including the experiences after initial training that helps the personnel to attain competencies relevant to their work (Gaspard & Yang, 2016). Of the methods available, distance education method has been used successfully in many

countries to provide CE for health care workers. With the advances in the healthcare system, it is essential that Sri Lanka evaluate the effectiveness of different strategies in updating the primary healthcare workers. Hence this study is an eye-opener for the policy-planners in relation to the in-service training of the health staff.

Pre-intervention assessment results showed that the overall knowledge was poor in both groups. Similarly there was no significant difference in attitudes, self-assessed competencies and performance between the two groups, thus the intervention and control groups were comparable before the intervention. Therefore, these results also discount the selection bias in the present study.

The findings of the pre-intervention assessment pointed to the need of CE as the total knowledge scores obtained was unsatisfactory. Only 17.1% of the study group and 23.9% of the control group have undergone any training on food safety during the past three years. Thus a majority of the PHI have had no opportunity for CE to improve and update their knowledge. The findings also revealed that the knowledge and performance in enactments in food safety, food sampling and legal procedures were poor. These findings were taken into consideration in selecting study topics for the distance education modules. Gap analysis is important in planning CE (Moore, Green, & Gallis, 2009) and identifying of needs has an impact on performance outcome in CE (Cervero & Gaines, 2015).

In training a large number of health care workers at different geographical locations, it is important to maintain uniformity of such training. In addition, the quality of educational materials provided will have an effect on the outcome of the intervention. The present study considered these factors and the services of experts were obtained in developing DE modules which were technically sound and of high quality. Uniformity was maintained by administering the modules in a similar manner at all centres where the training programme was conducted.

Since a time lag between the intervention and the post intervention assessment is needed to ascertain the sustainability of the effectiveness of the intervention, the post-intervention assessment was carried out four months after administering the final module.

In general there was no change in the attitudes towards implementation of food legislation in both intervention and control groups except for the views expressed on usefulness of in-service training. One of the reasons for no change in views in both groups may be due to the fact that there was no significant change in their working environment, resources and support services. However, these factors were outside the control of the present intervention.

CE activities can lead to improved competencies and performance (Moore et al., 2009). This study revealed that DE strategy used here was effective in improving the knowledge and performance significantly in the intervention group.

The intervention used in the present study was carried out with minimal interference to the routine duties of the trainees. Unlike institutional-based training programmes or workshops, trainees did not have to be away from the work place resulting in incurring a minimal cost. In the present educational intervention, printing cost incurred for the three distance education modules was minimal. Thus as a developing country with health care workers scattered throughout the island, due consideration should be given to shift from traditional institutional-based training at the central level to providing continuing education at the local setting using feasible, cost-effective methods such as DE where appropriate.

The study was limited to two districts in two provinces. This study was conducted in two districts as a quasi-experimental study. Since then the probability of a selection bias cannot be totally excluded. Overall picture could have been obtained if this study was conducted as an island-wide study. These were taken into account in the interpretation of findings. Sustainability of the improved performance as a result of the DE programme would have been better monitored if post interventional assessments were carried out at one-year and two-year period.

## V. CONCLUSION

The present intervention was effective in improving the knowledge and performance of the PHI in implementing legislation on food safety indicating the effectiveness of providing continues education to PHI using distance education method. As this method proved to be feasible, of low cost and has the ability to provide training without mobilizing the staff, it can be incorporated into the existing training system for health care workers.

### Notes on Contributors

Mahendra Arnold, Sepali Wickramatilake, Dinusha Fernando, Roshan Sampath and Palitha Karunapema are Public Health Specialists attached to the Ministry of Health. Pasyodun Koralage Buddhika Mahesh is a Senior Registrar in Community Medicine of the Ministry of Health.

### Ethical Approval

Ethical approval was obtained from Ethics Committee, Faculty of Medicine, University of Colombo.

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## Declaration of Interest

The authors do not have any conflict of interest to declare.

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Appendix A: Supplementary Table I–Comparison of PHI of the intervention and control groups by extent of agreement to statements related to implementation of legislation on food safety before and after intervention: a) Enactments b) Training c) Support services d) Other factors

**Supplementary Table 1a**

| Statement  | Intervention Group |           |           |            |          |           | Significance | Control Group |           |           |            |           |           | Significance |
|--|--------------------|-----------|-----------|------------|----------|-----------|--------------|---------------|-----------|-----------|------------|-----------|-----------|--------------|
|  | Pre n=105          |           |           | Post n=102 |          |           |              | Pre n=109     |           |           | Post n=105 |           |           |              |
|  | A (%)              | U (%)     | D (%)     | A (%)      | U (%)    | D (%)     |              | A (%)         | U (%)     | D (%)     | A (%)      | U (%)     | D (%)     |              |
| <b>a) Enactments</b>   |                    |           |           |            |          |           |              |               |           |           |            |           |           |              |
| Currently available legal provisions are adequate for maintenance of food safety and hygiene                           | 42 (40.0)          | 13 (12.3) | 50 (47.7) | 53 (52.0)  | 10 (9.8) | 39 (38.2) | NS           | 49 (44.9)     | 4 (3.7)   | 56 (51.4) | 52 (49.5)  | 5 (4.8)   | 48 (45.7) | NS           |
| Food safety can be maintained satisfactorily by educating and training of food handlers as against taking legal action | 35 (33.3)          | 7 (6.7)   | 63 (60.0) | 38 (37.2)  | 7 (6.9)  | 57 (55.9) | NS           | 39 (35.8)     | 7 (6.4)   | 63 (57.8) | 36 (34.3)  | 6 (5.7)   | 63 (60.0) | NS           |
| Increase control over advertisements on food would facilitate maintaining food safety                                  | 90 (85.7)          | 6 (5.7)   | 9 (8.6)   | 91 (89.2)  | 4 (3.9)  | 7 (6.9)   | NS           | 85 (78.0)     | 19 (17.4) | 5 (4.6)   | 86 (81.9)  | 15 (14.3) | 4 (3.8)   | NS           |

Note: Significance tested by Chi Square Test, NS – Not Significant ( $P \geq 0.05$ ), A – Agree, U – Undecided, D - Disagree

**Supplementary Table 1b**

| Statement   | Intervention Group |           |           |            |         |           | Significance                    | Control Group |           |           |            |           |           | Significance |
|---|--------------------|-----------|-----------|------------|---------|-----------|---------------------------------|---------------|-----------|-----------|------------|-----------|-----------|--------------|
|   | Pre n=105          |           |           | Post n=102 |         |           |                                 | Pre n=109     |           |           | Post n=105 |           |           |              |
|   | A (%)              | U (%)     | D (%)     | A (%)      | U (%)   | D (%)     |                                 | A (%)         | U (%)     | D (%)     | A (%)      | U (%)     | D (%)     |              |
| <b>b) Training</b>  |                    |           |           |            |         |           |                                 |               |           |           |            |           |           |              |
| The basic training received by the PHI on food legislation is adequate to meet the needs and challenges in food safety activities               | 11 (10.5)          | 5 (4.8)   | 89 (84.7) | 6 (5.9)    | 6 (5.9) | 90 (88.2) | NS                              | 13 (11.9)     | 3 (2.7)   | 93 (85.4) | 13 (12.4)  | 2 (1.9)   | 90 (85.7) | NS           |
| Currently available opportunities for in-service training on food safety are adequate   | 6 (5.7)            | 18 (17.1) | 81 (77.2) | 7 (6.9)    | 9 (8.8) | 86 (84.3) | NS                              | 4 (3.7)       | 8 (7.3)   | 97 (89.0) | 6 (5.7)    | 4 (3.8)   | 95 (90.5) | NS           |
| Knowledge and skills received at in-service training on food safety will be useful and motivates the PHI to carry out activities on food safety | 68 (64.8)          | 17 (16.2) | 20 (19.0) | 92 (90.2)  | 6 (5.9) | 4 (3.9)   | $\chi^2=1$<br>9.49<br>$P=0.000$ | 78 (71.6)     | 13 (11.9) | 18 (16.5) | 80 (76.2)  | 16 (15.2) | 9 (8.6)   | NS           |

Note: Significance tested by Chi Square Test, NS – Not Significant ( $P \geq 0.05$ ), A – Agree, U – Undecided, D - Disagree

**Supplementary Table 1c**

| Statement  | Intervention Group |           |           |            |           |           | Significance | Control Group |           |           |            |           |           | Significance |
|--|--------------------|-----------|-----------|------------|-----------|-----------|--------------|---------------|-----------|-----------|------------|-----------|-----------|--------------|
|  | Pre n=105          |           |           | Post n=102 |           |           |              | Pre n=109     |           |           | Post n=105 |           |           |              |
|  | A (%)              | U (%)     | D (%)     | A (%)      | U (%)     | D (%)     |              | A (%)         | U (%)     | D (%)     | A (%)      | U (%)     | D (%)     |              |
| <b>c). Support services</b>  |                    |           |           |            |           |           |              |               |           |           |            |           |           |              |
| <i>Following factors are at a satisfactory level for the successful implementation of legislation in food safety</i> |                    |           |           |            |           |           |              |               |           |           |            |           |           |              |
| ⇒The support from the supervising officers   | 59 (56.2)          | 10 (9.5)  | 36 (34.3) | 62 (60.8)  | 11 (10.8) | 29 (28.4) | NS           | 55 (50.5)     | 8 (7.3)   | 46 (42.2) | 50 (47.6)  | 14 (13.3) | 41 (39.1) | NS           |
| ⇒The support from local Authorities  | 31 (29.5)          | 11 (10.5) | 63 (60.0) | 29 (28.4)  | 9 (8.8)   | 64 (62.8) | NS           | 53 (48.7)     | 9 (8.2)   | 47 (43.1) | 51 (48.6)  | 5 (4.7)   | 49 (46.7) | NS           |
| ⇒Available transport Facilities  | 15 (14.3)          | 9 (8.6)   | 81 (77.1) | 16 (15.7)  | 4 (3.9)   | 82 (80.4) | NS           | 16 (14.7)     | 14 (12.8) | 79 (72.5) | 18 (17.1)  | 16 (15.3) | 71 (67.6) | NS           |
| ⇒Available funds   | 25 (23.8)          | 8 (7.6)   | 72 (68.6) | 24 (23.5)  | 11 (10.8) | 67 (65.7) | NS           | 36 (33.0)     | 10 (9.2)  | 63 (57.8) | 31 (29.5)  | 8 (7.6)   | 66 (62.9) | NS           |
| ⇒Available laboratory Facilities   | 11 (10.5)          | 9 (8.6)   | 85 (80.9) | 7 (6.8)    | 5 (4.9)   | 90 (88.3) | NS           | 13 (12.0)     | 11 (10.1) | 85 (77.9) | 10 (9.5)   | 9 (8.6)   | 86 (81.9) | NS           |
| Availability of a standard set of equipments for food sampling will facilitate food-sampling                         | 91 (86.6)          | 9 (8.6)   | 5 (4.8)   | 94 (92.2)  | 5 (4.9)   | 3 (2.9)   | NS           | 102 (93.6)    | 3 (2.7)   | 4 (3.7)   | 98 (93.3)  | 5 (4.8)   | 2 (1.9)   | NS           |

Note: Significance tested by Chi Square Test, NS – Not Significant ( $P \geq 0.05$ ), A – Agree, U – Undecided, D - Disagree

**Supplementary Table 1d**

| Statement   | Intervention Group |           |           |            |           |           | Significance | Control Group |         |           |            |           |           | Significance |
|---|--------------------|-----------|-----------|------------|-----------|-----------|--------------|---------------|---------|-----------|------------|-----------|-----------|--------------|
|   | Pre n=105          |           |           | Post n=102 |           |           |              | Pre n=109     |         |           | Post n=105 |           |           |              |
|   | A (%)              | U (%)     | D (%)     | A (%)      | U (%)     | D (%)     |              | A (%)         | U (%)   | D (%)     | A (%)      | U (%)     | D (%)     |              |
| <b>d). Other factors</b>  |                    |           |           |            |           |           |              |               |         |           |            |           |           |              |
| Even though limited time is available for food safety activities due to various other duties, it is not an obstacle in carrying out food safety activities successfully | 66 (62.8)          | 11 (10.5) | 28 (26.7) | 71 (69.6)  | 5 (4.9)   | 26 (25.5) | NS           | 59 (54.1)     | 9 (8.2) | 41 (37.7) | 61 (58.1)  | 14 (13.3) | 30 (28.6) | NS           |
| Activities on legislation related to food safety can be carried out successfully when there is no political interference.   | 73 (69.6)          | 14 (13.3) | 18 (17.1) | 70 (68.6)  | 18 (17.7) | 14 (13.7) | NS           | 69 (63.3)     | 8 (7.3) | 32 (29.4) | 66 (62.9)  | 6 (5.7)   | 33 (31.4) | NS           |
| Giving priority to food safety activities in the duties of the PHI will have a major effect in improving health of the community  | 96 (91.5)          | 3 (2.8)   | 6 (5.7)   | 97 (95.2)  | 3 (2.9)   | 2 (1.9)   | NS           | 101 (92.6)    | 1 (0.9) | 7 (6.5)   | 98 (93.3)  | 3 (2.9)   | 4 (3.8)   | NS           |

Note: Significance tested by Chi Square Test, NS – Not Significant ( $P \geq 0.05$ ), A – Agree, U – Undecided, D - Disagree



Appendix B: Supplementary Table 2–Comparison of self assessed competencies between the pre and post intervention assessments in the intervention and control groups: a) in inspection of food establishments and food sampling, b) in legal procedures, and c) planning and documentation.

**Supplementary Table 2a:** Comparison of PHI who were self competent in inspection of food establishments and food sampling before and after the intervention

| Task  | Intervention Group<br>n=102 (%) |              |                  | Control Group<br>n=105 (%) |              |                  |
|---|---------------------------------|--------------|------------------|----------------------------|--------------|------------------|
|   | Pre                             | Post         | Signifi<br>cance | Pre                        | Post         | Signifi<br>cance |
| Inspection and categorization of food establishments        | 93<br>(91.2)                    | 98<br>(96.1) | NS               | 96<br>(91.4)               | 99<br>(94.3) | NS               |
| Detecting irregularities that violate labelling regulations | 77<br>(75.5)                    | 86<br>(84.3) | NS               | 85<br>(80.9)               | 90<br>(85.7) | NS               |
| Sampling for bacteriological examination                    | 82<br>(80.4)                    | 92<br>(90.2) | NS               | 89<br>(84.7)               | 91<br>(86.7) | NS               |
| Sampling for chemical examination                           | 89<br>(87.2)                    | 94<br>(92.1) | NS               | 95<br>(90.5)               | 96<br>(91.4) | NS               |

Note. Significance tested by McNemar Test, NS – Not Significant (  $P \geq 0.05$  )

**Supplementary Table 2b:** Comparison of PHI who were self-competent in legal procedures before and after the intervention

| Task  | Intervention Group<br>n=102 (%) |              |                             | Control Group<br>n=105 (%) |               |                  |
|---|---------------------------------|--------------|-----------------------------|----------------------------|---------------|------------------|
|   | Pre                             | Post         | Signifi<br>cance            | Pre                        | Post          | Signifi<br>cance |
| Correctly identifying the legislation in which, different violations of food safety be prosecuted | 73<br>(71.6)                    | 90<br>(88.2) | $\chi^2=13.52$<br>$P<0.001$ | 81<br>(77.1)               | 84<br>(80.0)  | NS               |
| Implementing legislation on manufacture of food   | 78<br>(76.5)                    | 91<br>(89.2) | NS                          | 77<br>(73.3)               | 87<br>(82.9)  | NS               |
| Implementing legislation on food processing   | 73<br>(71.6)                    | 88<br>(86.3) | NS                          | 75<br>(71.4)               | 80<br>(76.2)  | NS               |
| Implementing legislation on storage of food   | 82<br>(80.4)                    | 91<br>(89.2) | NS                          | 83<br>(79.0)               | 84<br>(80.0)  | NS               |
| Implementing legislation on food transport  | 78<br>(76.5)                    | 92<br>(90.2) | NS                          | 71<br>(67.6)               | 77<br>(73.3)  | NS               |
| Implementing legislation on sale of foods   | 89<br>(87.3)                    | 95<br>(93.1) | NS                          | 96<br>(91.4)               | 102<br>(97.1) | NS               |
| Performing court procedures in court cases in food safety   | 58<br>(56.9)                    | 84<br>(82.3) | $\chi^2=20.05$<br>$P<0.001$ | 67<br>(63.8)               | 72<br>(68.6)  | NS               |

Note: Significance tested by McNemar Test, NS – Not Significant (  $P \geq 0.05$  )

**Supplementary Table 2c:** Comparison of PHI who were self-competent in planning and documentation before and after the intervention

| Task  | Intervention Group<br>n=102 (%) |               |                  | Control Group<br>n=105 (%) |               |                  |
|---|---------------------------------|---------------|------------------|----------------------------|---------------|------------------|
|   | Pre                             | Post          | Signifi<br>cance | Pre                        | Post          | Signifi<br>cance |
| Drawing up an action plan for food safety for the area      | 84<br>(82.3)                    | 90<br>(88.2)  | NS               | 95<br>(90.5)               | 99<br>(94.3)  | NS               |
| Conducting awareness and training programmes on food safety | 82<br>(80.4)                    | 92<br>(90.2)  | NS               | 91<br>(86.7)               | 98<br>(93.3)  | NS               |
| Correct documentation of the Pocket Note Book               | 96<br>(94.1)                    | 100<br>(98.1) | NS               | 100<br>(95.2)              | 102<br>(97.1) | NS               |
| Maintaining office records related to food safety           | 98<br>(96.1)                    | 100<br>(98.1) | NS               | 97<br>(92.4)               | 100<br>(95.2) | NS               |

Note: Significance tested by McNemar Test, NS – Not Significant (  $P \geq 0.05$  )