



**OCULAR HEALTH AND SAFETY AMONG COCOA FARMERS:  
A Guide for Trainers, Cocoa Farmers and Farmworkers.**

**BY**

**SAMUEL BERT BOADI-KUSI**

**(212562018)**

**A TRAINING MANUAL DEVELOPED AS PART OF DOCTORAL THESIS PRESENTED TO  
THE UNIVERSITY OF KWA-ZULU NATAL, DURBAN-SOUTH AFRICA.**

**2014**

## TABLE OF CONTENTS

Content	Page
Purpose .....	1
Instructions.....	1
PART 1: INTRODUCTION TO THE MANUAL .....	2
1. Ocular health and safety in cocoa farms .....	2
2. Safety and Health in Agriculture 2001(ILO CONVENTION NO. 184).....	3
3. Definition of Hazard and Risk.....	7
a. Mechanical hazards .....	7
b. Physical hazards .....	7
c. Biological hazards .....	8
d. Psycho-social hazards.....	8
e. Ergonomic hazards .....	8
f. Chemical hazards.....	8
g. Environmental hazards.....	8
PART 2: BASIC INFORMATION ON EYE HEALTH: A GUIDE FOR TRAINERS.....	9
1. Basic structure of the human eye.....	9
2. Ocular hazards, risks and exposures in cocoa farms .....	10
a. Eye Injuries (diseases) from farm tools.....	10
b. Eye injuries (diseases) from plants.....	11
c. Chemical exposure .....	11
d. Exposure to ultraviolet radiations .....	12
e. Exposure to other farm activities .....	13
f. Drugs: smoking, alcohol and eye injury/ diseases .....	13
3. Use of ocular protective devices .....	14

a. Protective eyewear recommended for cocoa farmers.....	14
b. Prescription Glasses (Spectacles) .....	15
c. Factors to consider before selecting protective eyewear.....	15
d. Maintenance of protective eyewear .....	16
e. Misconception and barriers to use of protective eyewear .....	16
4. Common ocular conditions among farming populations .....	17
a. Ocular health seeking behaviour and barriers to seeking eyecare .....	20
5. Ocular emergencies in farms and basic first aid.....	21
a. Foreign body in the eye.....	21
b. Blunt injury.....	21
c. Penetrating injury .....	22
d. Chemical injury .....	22
i. Eye flushing technique .....	23
ii. Handling Chemicals .....	23
6. Stress on the Farm.....	24
7. General consideration for prevention of eye injuries in the farm and maintaining eye health .....	25
Part 3: SIMULATION EXERCISES .....	26
Exercise 1: Ocular safety and health .....	26
Exercise 2a: Basic Ocular First Aid: Chemical injury .....	29
Exercise 2b: Basic first aid: Penetrating injury .....	30
Exercise 3: Identification of potential hazards .....	32
Lesson Planner .....	34
Evaluation questionnaire.....	35
References.....	37



# **Ocular Health and Safety among Cocoa Farmers: A Guide for Trainers, Cocoa Farmers and Farmworkers**

## **Purpose**

The objective of this Ocular Health and Safety Manual for trainers and cocoa farmers is to enhance an understanding and create an awareness of the ocular hazards and risks in cocoa farms and offer guidelines for safe ocular health practices among farmers. The overall goal is to promote a safe and healthy work environment with reduced exposures to the risk of ocular injuries and diseases. The manual discusses ocular health, safety and environmental problems at work in cocoa farms, ocular hazards that farmers face at the work place, available protective methods, as well as, basic ocular first aids. Stakeholders and potential trainers in the agricultural industry are required to be familiar with the information presented in this manual. This will help trainers plan and execute ocular health and safety educational training for cocoa farmers. The guidelines provided in this manual are not absolute and therefore necessary assistance should be sought from eye care professionals when the need arises.

## **Instructions**

Trainers are expected to review this manual which contains very basic information on ocular health and safety for cocoa farmers. Efforts should be made to read from other sources or clarification sought from eye care professionals when the need arises. A sample lesson planner has been attached to assist trainers remember key points from their reviews. The training is expected to last for a period of between 3 to 5 hours. It is recommended that the training is done in smaller groups of not more than 15 participants. Simulation exercises have been provided to re-enforce the training lessons. Where there are time constraints, exercise 1 and any of exercise 2a or 2b should be discussed.

## **PART 1: INTRODUCTION TO THE MANUAL**

### **1. Ocular health and safety in cocoa farms**

Agricultural work has been described as the most riskiest and hazardous for the eye (Leibman et al, 2010; Quandt et al, 2008), after the mining industry (Tettey et al, 2009). A number of ocular injuries and diseases have been reported among farmers and farmworkers (Quandt et al, 2008, Verma et al, 2011; Taylor et al, 2006; Retzlaff and Hopewell, 1996). These diseases and injuries have been linked to risks and hazards faced when doing farm work.

The cocoa industry, has several inherent hazardous elements and risks with negative implications for eye health. There is generally a high use of manual labour, including both household and hired labour with less use of machinery. Although this may suggest less ocular injury, the contrary exists (Shashikala et al, 2013; McCall et al, 2009). The involvement of a vulnerable workforce; aged, women and children who are prone to ocular injuries and diseases is common in cocoa farms. (Mulierman, 2013; Maltias, 2007; Assuming-Brempong et al, 2006). The process of cocoa farming in Ghana involves land preparation which starts with clearing of weeds, cutting down trees, drying and burning of the bushes as well as removal of remains of trees after burning, planting among others. Farmers normally use hand held equipment such as machetes, harvesting hooks, pick axes, hoes, spraying machines, etc in their activities. Application of chemicals such as weedicides, fungicides, pesticides and fertilizers is a common practice among these farmers. These activities have the potential to cause ocular injuries and diseases among the farmers.

Many of the tools used in cocoa production could pose ocular health hazards to the farmer if not used properly (Boadi-Kusi et al, 2014; Tettey et al, 2009). Similarly, pesticides exposure during loading, mixing and spraying, as well as, pesticide residue on crops has been reported to cause damage to several ocular structures (Quandt et al, 2008; Strong et al, 2008). Continuous exposure to ultraviolet radiations has also been shown to cause damage to several ocular structures (Mahmoud et al, 2010; Carson, 2009; Johnson, 2004). Other hazards on the farm such as falling branches, thorns, vines, pollens, insect bites, among others pose a serious threat to the eyes. Due to the seasonality of cocoa

production, farmers may be forced to work under pressure to complete specific tasks. Stress from these activities may also lead to poor hand eye coordination, which could have serious implications for the ocular health of these farmers (Muilerman, 2013; Tetley et al, 2009).

Despite these numerous ocular health hazards, farmers and farmworkers are known to be engaged in risky ocular health practices, due in part to lack of knowledge and information about the ocular risks and hazards which exists in farms. Other risky practices include carelessness in the handling of farm tools and agrochemicals. In spite of this farmworkers have been reported to poorly utilize eye care services due to poverty, limited access to health facilities and health insurance (Quandt et al, 2012; Leibman and Augustave, 2010; Tetley et al, 2009; Quandt et al, 2008; Forst et al, 2006). Farmers are also known to underutilize ocular protective devices (Quandt et al, 2012). These exposures and practices may result in farmers being afflicted with work-related eye diseases and injuries such as traumatic cataract, pterygium, conjunctivitis among others (Boadi-Kusi et al, 2014; Quandt et al, 2012).

These ocular health and safety challenges prompts the need for ocular health and safety awareness among cocoa farmers to help safeguard their vision since “the efficiency with which employee sees is directly related to how efficiently and safely they perform on the job” (Sherman, 1970: 26 cited in Pitts and Kleinstein, 1993). This manual has therefore been prepared, to be used to educate farmers on injury prevention, basic first aid for ocular injuries, utilization of ocular protective devices and many others in order to lessen the ocular health challenges farmers face.

## **2. Safety and Health in Agriculture 2001(ILO CONVENTION NO. 184)**

Workers are the focal point of all productivity issues at the work place and hence, issues relating to health are important and should not be taken for granted, particularly as it relates to their vision (Burton, 2010). Good is important to the individual workers and their families, as well as, to the productivity, competitiveness and sustainability of organizations (WHO, 2010). Recognizing the importance and health needs of agricultural workers, the

ILO and its partners approved this convention to motivate its members to adopt measures that will protect the health of its agricultural workers both in the formal and informal sectors (ILO, 2001). The convention was ratified by the Government of Ghana in 2011 but is yet to be implemented. Below are key highlights of the convention which was adopted at the, 89th ILC session, Geneva on 21 Jun 2001 and came into effect on the 20th of September 2003. *[These highlights are to educate trainers and farmers on the rights of workers in agricultural employments in the global context]*

#### **"Article 4**

1. In the light of national conditions and practice and after consulting the representative organizations of employers and workers concerned, members shall formulate, carry out and periodically review a coherent national policy on safety and health in agriculture. This policy shall have the aim of preventing accidents and injury to health arising out of, linked with, or occurring in the course of work, by eliminating, minimizing or controlling hazards in the agricultural working environment.

2. To this end, national laws and regulations shall:

- (a) designate the competent authority responsible for the implementation of the policy
- (b) and for the enforcement of national laws and regulations on occupational safety and health in agriculture;
- (c) specify the rights and duties of employers and workers with respect to occupational safety and health in agriculture; and
- (d) Establish mechanisms of inter-sect oral coordination among relevant authorities and bodies for the agricultural sector and define their functions and responsibilities, taking into account their complementarity and national conditions and practices.

3. The designated competent authority shall provide for corrective measures and appropriate penalties in accordance with national laws and regulations, including, where appropriate, the suspension or restriction of those agricultural activities which pose an imminent risk to the safety and health of workers, until the conditions giving rise to the suspension or restriction have been corrected.



## **Article 5**

1. Members shall ensure that an adequate and appropriate system of inspection for agricultural workplaces is in place and is provided with adequate means.

2. In accordance with national legislation, the competent authority may entrust certain inspection functions at the regional or local level, on an auxiliary basis, to appropriate government services, public institutions, or private institutions under government control, or may associate these services or institutions with the exercise of such functions.

## **Article 6**

1. In so far as is compatible with national laws and regulations, the employer shall have a duty to ensure the safety and health of workers in every aspect related to the work.

2. National laws and regulations or the competent authority shall provide that whenever in an agricultural workplace two or more employers undertake activities, or whenever one or more employers and one or more *self-employed* persons undertake activities, they shall cooperate in applying the safety and health requirements. Where appropriate, the competent authority shall prescribe general procedures for this collaboration.

## **Article 7**

In order to comply with the national policy referred to in this Convention, national laws and regulations or the competent authority shall provide, taking into account the size of the undertaking and the nature of its activity that the employer shall:

(a) carry out appropriate risk assessments in relation to the safety and health of workers and, on the basis of these results, adopt preventive and protective measures to ensure that under all conditions of their intended use, all agricultural activities, workplaces, machinery, equipment, chemicals, tools and processes under the control of the employer are safe and comply with prescribed safety and health standards;

(b) ensure that adequate and appropriate training and comprehensible instructions on safety and health and any necessary guidance or supervision are provided to workers in agriculture, including information on the hazards and risks associated with their work and the action to be taken for their protection, taking into account their level of education and differences in language; and

(c) take immediate steps to stop any operation where there is an imminent and serious danger to safety and health and to evacuate workers as appropriate.

## **Article 8**

1. Workers in agriculture shall have the right:

(a) to be informed and consulted on safety and health matters including risks from new technologies;

(b) to participate in the application and review of safety and health measures and, in accordance with national law and practice, to select safety and health representatives and representatives in safety and health committees; and

(c) to remove themselves from danger resulting from their work activity when they have reasonable justification to believe there is an imminent and serious risk to their safety and health and so inform their supervisor immediately. They shall not be placed at any disadvantage as a result of these actions.

2. workers in agriculture and their representatives shall have the duty to comply with the prescribed safety and health measures and to cooperate with employers in order for the latter to comply with their own duties and responsibilities.

3. The procedures for the exercise of the rights and duties referred to in paragraphs 1 and 2 shall be established by national laws and regulations, the competent authority, collective agreements or other appropriate means.

4. Where the provisions of this Convention are implemented as provided for by paragraph 3, there shall be prior consultation with the representative organizations of employers and workers concerned.

These and other provisions of the convention brings to fore, the need to advocate for the ocular, as well as, the general health and quality of life of agricultural workers in the formal or informal sector and whether in a permanent, temporal/seasonal (e.g. hired labourers) agricultural work." (ILO, 2001:2-3).

### **3. Definition of Hazard and Risk**

A "hazard" is anything with the potential to do harm, whereas a "risk" is the likelihood of potential harm from that hazard being realized (COA, 2012; Aw, 2007; Hurst and Kirby, 2004; Cox et al, 2000). Putting this in context, the hazard associated with spraying insecticide might be getting it spilt into the eye but the risk of the situation occurring may be high if no eye protection is worn. If however, precautionary measures are adopted to reduce injury, then the risk will be reduced. There are different types of hazards in agriculture and can be grouped but not exclusively as follows:

#### **a. Mechanical hazards**

These may be injuries from tools and poorly designed agricultural machinery. These tools are major causes of accidents (Carson, 2009; Pitts and Kleinstein, 1993).

#### **b. Physical hazards**

These are hazards faced by agricultural workers such as those from noisy machinery, excessive vibration from tractors, chain saws, etc. Injuries from falls, tools and solar radiation resulting in a number of eye conditions may also be classified as physical hazards (Carson, 2009; Pitts and Kleinstein, 1993)

**c. Biological hazards**

Cocoa farmers are at risk of several work-related diseases and disorders. These could be from bacteria, fungi, viruses, from plant sources as well as allergens, pollens, among others (Hurst and Kirby, 2004; Pitts and Kleinstein, 1993).

**d. Psycho-social hazards**

These include problems that can induce ill health such as invasion of pests on farms, poor yields, stress, poverty, long working hours of work, lack of control over work, lack of rest, among others (Carson, 2009; Tetley et al, 2009)

**e. Ergonomic hazards**

These include hazards associated with the failure to make the job fit the worker and can cause permanent injuries and disability. They include, poorly designed machinery, prolonged static working positions, repetitive work, unsuitable tools used by workers (Aw, 2007, Pitts and Kleinstein, 1993).

**f. Chemical hazards**

A wide range of ocular outcomes such as corneal scars, eye irritations, *etc.* may arise due to accidents from chemicals hazards such as pesticides and fertilizers (Tetley et al, 2009; Hurst and Kirby, 2004).

**g. Environmental hazards**

Environmental hazards from cocoa farming may include contamination from pesticide application which could pollute water and soil, as well as, crops which may be consumed by man (Carson, 2009; Tetley et al, 2009; Aw, 2007; Pitts and Kleinstein, 1993).

## PART 2: BASIC INFORMATION ON EYE HEALTH: A GUIDE FOR TRAINERS

### 1. Basic structure of the human eye

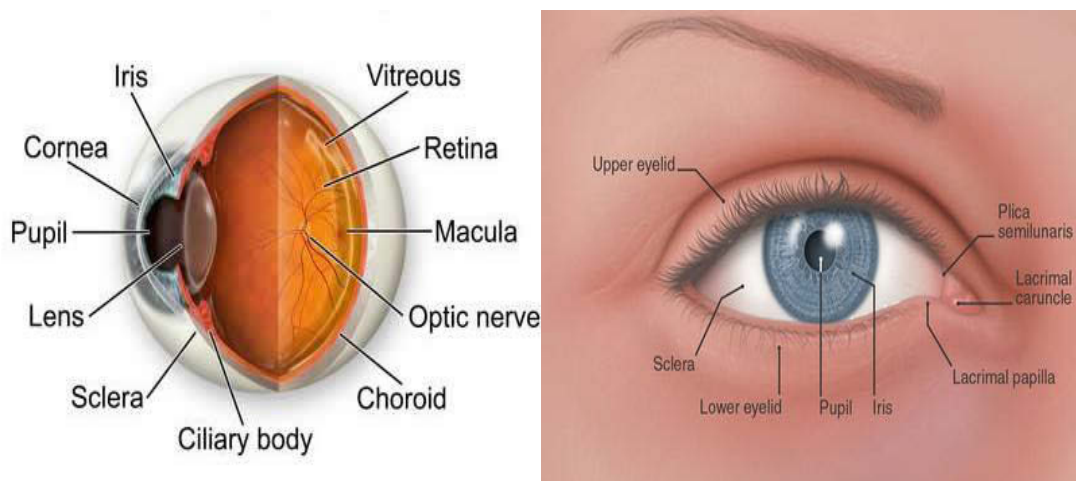
The eye is the sense organ for sight. The external part of the eye is made up of the eyelid, eyelashes and brow , cornea, pupils and sclera. The main functions of the various parts of the eye (Table 1) and the structure of the eye (Figure 1) are as follows;

**Table 1: Parts of the eye and functions**

Parts	Description and Functions
<b>Cornea</b>	The cornea is the transparent structure covering the coloured part of the eye. It allows the eye to properly focus on light more effectively. This dome-shaped structure protects the eye from elements that could cause damage to the inner parts of the eye.
<b>Sclera</b>	The sclera is commonly referred to as the "whites" of the eye, which is the protective outer layer. This is a smooth, white layer on the outside, but the inside is brown and contains grooves that help the tendons of the eye muscles to attach properly. The sclera provides structure and safety for the inner workings of the eye, but is also flexible so that the eye can move as necessary.
<b>Pupil</b>	The pupil appears as a black dot in the middle of the eye. This black area is actually a hole which allows light to other parts of the eye which is essential to seeing.
<b>Iris</b>	The iris is the area of the eye that contains the pigment which gives the eye its color. This controls the size of the pupil and allows the eye to take in more or less light depending on how bright it is around you. If it is too bright, the iris will shrink the pupil so that they eye can focus more effectively.
<b>Conjunctiva Glands</b>	These are layers of mucus which help keep the outside of the eye moist. If the eye dries out it can become itchy and painful. It can also become more susceptible to damage or infection.
<b>Lens</b>	The lens sits directly behind the pupil. This is a clear layer that focuses the light that enters through the pupil. It is held in place by the ciliary muscles, which allow the lens to change shape depending on the amount of light that hits it so it can be properly focused.
<b>Retina</b>	The light focuses by the lens will be transmitted onto the retina. The retina is located in the back of the eye, and is connected to the optic nerves that will transmit the images the eye sees to the brain so they can be interpreted.

Adapted from: <http://www.md-health.com/Parts-Of-The-Eye-And-Its-Function.html>

Below is a structure of the human eye indicating the various parts.



**Figure 1: Basic structure of the eye**

**Source:** <http://www.google.co.za>

It is important to note that external infections to the eye normally affect the conjunctiva. A growth may also develop on the conjunctiva that covers the white part of your eye (pterygium). The cornea, which is made up of thin layers, can be abraded even in minor injury conditions and if not well managed, could lead to reduced vision and in some cases blindness. The lens could also become opaque (cataract) due to exposure to UV radiations and trauma (Kanski, 2009).

## **2. Ocular hazards, risks and exposures in cocoa farms**

Eye injury is defined as any injury occurring to the eye and/or adnexa that occur in the workplace (Thompson and Mollan, 2009; Chen et al, 2007). Work-related eye diseases on the other hand, are those where work is one of several factors contributing to the disease (ILO, 2005). Eye injuries, diseases and exposure to hazards may occur from varied sources in the farm, some of which are listed below.

### **a. Eye Injuries (diseases) from farm tools**

Various handheld tools (e.g. machetes, axes, harvesting hooks) used by cocoa farmers on farms for various activities. The use of these tools can cause injuries to the eye if proper care is not taken. For example, a machete or an axe could hit the eye to cause an injury with severe implication to vision if not managed properly.

Likewise, a harvesting hook could drop from high above the cocoa tree to hit the eye of the farmer if appropriate protection is not worn at the time of harvesting. Corneal abrasions from foreign bodies invading the eye may also occur due to the use of grinding machines to sharpen tools (Lacey et al, 2007). These injuries could lead to a traumatic cataract, corneal clouding and secondary glaucoma which could lead to visual impairment and blindness. Since farm tools are potential blinding agents, it is important to handle them well. Therefore farmers must learn to observe the following.

- b. **"Keep cutting-edge tools sharp:** Dull cutting-edge tools are dangerous, as they require excessive pressure to make them cut. Pieces of wood cut from blunt tools have the potential of hitting the eye to cause injury.
- b. **Carry and store tools properly:** All sharp-edge tools should be carried or stored with the cutting edge down to minimize the risk of injury" (OSU, 2004: 27).
- b. **Inspect tools before using:** Avoid using damaged or ill-maintained tools until they have been repaired, and have them checked before use. For example a loose harvesting hook that is not checked before use, may fall from a height to hit the eye.
- b. **"Grip tools firmly:** Hold hand tools securely so that they do not slip and hit someone. Do not wear gloves, as they are bulky and will make gripping tools difficult" (OSU, 2004: 27)

#### **b. Eye injuries (diseases) from plants**

Cocoa farmers often come into contact with plants, branches, thorns, vines, stalks, pollens and bushes. Eye injuries may occur due to contact with any of these plant substances if precautions are not taken (Verma, 2010; Quandt et al, 2008). Biological hazards may also be transmitted from these plants to the eye and cause infection. The prevalence of eye abrasions from these sources may be high among farmers due to the failure to use ocular protection (Verma, 2010).

#### **c. Chemical exposure**

Pesticide exposures are one common hazard faced by cocoa farmers. The major pesticide groups are insecticides, herbicides, fungicides, and plant growth regulators (Muilerman, 2013; Banjo et al, 2010). The major activities involved in the use of agrochemicals are loading, mixing and application. Chemical applicators also clean up (after use), store and dispose-off empty containers. The riskiest activity for fungicide

and insecticide use is mixing and loading because they are mostly in concentrated forms (Banjo et al, 2010). The most common routes of exposure to pesticides are inhalation, ingestion, and dermal contact (Echobichon, 1996; Sullivan and Blose, 1992). There is also the risk of ocular exposure to toxic pesticides, especially in their concentrated forms which may directly enter eye tissues (Bradberry et al, 2004; Mckeag et al, 2002). It is important to note that chemicals may also enter the eye through accidental splashes and could be absorbed into the eye tissue and enter the circulation (Bradberry et al, 2004). Direct handling of chemicals and occasionally touching the eye when cleaning sweat off one's face, aerial spraying of pesticides into the environment over farms, increases the risk of ocular exposure among workers on the ground (Jaga and Dharmani, 2006; Ciesielski et al, 1994). Similarly, poor and ill-maintained spraying machines, as well as, inappropriate use of ocular protective equipment could expose farmers to chemical ocular injuries.

The main symptoms of pesticide exposure to the eyes are; irritation, burning sensation, itching, blurring of vision and tearing of eyes (Lu, 2005; CDC, 2005; Bradberry et al, 2004; Strong et al, 2004). Early entry of sprayed farms other than the minimum allowed time, going into fumigated fields before the required safety period or contact with residues in the crops could also be a source of eye irritation (Salvatore et al, 2008; Strong et al, 2008). All ocular structures; conjunctiva, cornea, iris, lens, retina, and the optic nerve, including neural pathways extending from the brain are affected by chemical exposure (toxic), but that to the conjunctiva is obvious since it is visible to the eye and may include inflammation, congestion or edema (chemosis) causing the eye to appear red (Jaga and Dharmani, 2006).

#### **d. Exposure to ultraviolet radiations**

Continuous exposure to ultraviolet radiations (UVR) especially at the formative ages of the cocoa farm, as well as, throughout the years of a cocoa farmer is a major ocular hazard. Exposure to UVR affects several workers. Agricultural workers are one group of workers who face outdoor solar exposure leading to several effects on the different ocular media (Quandt et al, 2008; Sprince et al, 2008). Ultraviolet radiation is divided into three categories: UVA from 320 to 380 or 400 nm; UVB from 290 to 320nm; and UVC 200 to 290 about nm (Kolozsva'ri et al, 2002; Threlfall and English, 1999). UVC is completely absorbed by the ozone in the atmosphere, whereas UVB and UVA are



transmitted through the atmosphere to reach the earth. UVA is transmitted by the cornea and absorbed primarily by the lens, but small amounts are transmitted and are incident on the retina (Threlfall and English, 1999). UVB below 295 nm is absorbed by the cornea, and most of the UV from 295 to 320 nm is absorbed by the lens. Beginning at about 305nm, a small but significant amount of UVB impinges on the retina (Carson, 2009).

Acute clinical effects of UVR on the eye include photokeratitis, a painful transient inflammatory condition, which could be regarded as sunburn of the eye; while cataract, pterygium and pinguecula formation, etc are regarded as chronic effects (Mahmoud et al, 2010; Johnson, 2004).

#### **e. Exposure to other farm activities**

Exposure to smoke from burning bushes which is a common practice among cocoa farmers may affect the eye. Insect bites (commonly bees) on cocoa farms also affect the eye and may incapacitate farmers for days. Other activities such as weeding, pruning, splitting of pods, have the potential of exposing farmers to ocular injuries. Ocular injuries may also occur as a result of flying objects and other foreign bodies that may be common on the farm.

#### **f. Drugs: smoking, alcohol and eye injury/ diseases**

Two major social drugs used among cocoa farmers are alcohol and tobacco (Muilerman, 2013). Apart from the contribution of these drugs to changes in physiological processes leading to various pathologies in the eye (Oshika, 1995; Bartlett and Jaanus, 2001) such as dyschromatopsia (alteration in colour perception), scotoma and tobacco-alcohol amblyopia (Sancho-Tello et al, 2008; Pitts and Kleinstein, 1993), the major concern is the contribution of these drugs to ocular injury if taken prior to or during working hours since they may affect balance, concentration, judgment and vision. Farmers who get intoxicated by alcohol may fail basic hand eye coordination and cause injury to their eyes. Equally, smoking while spraying chemicals, or undertaking other farm activities could also lead to eye injuries on the farm due to poor concentration. These drugs have also been reported to exacerbate eye conditions such as pterygia, pingueculae and cataracts among others (Klein et al, 1993).

### **3. Use of ocular protective devices**

The use of ocular protective devices is often the most common approach to protection for farm workers (Lipscomb, 2010; Hurst and Kirby, 2004). This may well be founded as personal protective equipment (PPEs) is cost-effectiveness, readily available (Lipscomb, 2010; Good, 2001, Geigle, 2000; Pitts and Kleinstein, 1993) and offer safety for all types of ocular injuries (Shen et al, 2013).

Almost all activities cocoa farmers are involved in on the farm are potentially blinding activities and hence require the use of ocular protection. From weeding, burning of vegetation, planting, application of fertilizer (in powder form), to pruning, spraying, plucking of pods from the top of cocoa trees, as well as, breaking of the cocoa pods with knives. However, most training manuals for cocoa farmers and agricultural workers only highlight the use of goggles during spraying with pesticides (Tettey et al, 2009). Eye injuries can lead to pain, loss of time, money and sometimes blindness (OSU, 2004; Pitts and Kleinstein, 1993). "Even a minor loss of impairment of vision is a great price to pay for a minute of negligence" (OSU, 2004:26). It is a dreadful reminder of the consequence/s of taking a risk. It is therefore important to wear appropriate eye protection where ocular hazards are obvious (AOA, 2013; Good, 2001). Protective eye devices are known to prevent about 90% of eye injuries (Peate, 2007) Normally, the rule of thumb is that, "the use of personal protective equipment is required when there is a reasonable probability that injury or illness can be prevented by such equipment." (OSU, 2004:25)

#### **a Protective eyewear recommended for cocoa farmers**

Several types of ocular protection are available for use by agricultural workers. Hats and sun shades are also recommended for reducing the amount of UVR that reaches the eye. Due to the various types of ocular protection available, selecting which type to be used must be based on the type of activity one is engaged in on the farm. For example, splash goggles [photograph] are recommended when handling and applying chemicals (Tettey et al, 2009). When broadcasting fertilizer in a dust form, vent proof goggles may be used [Photograph]. However, other impact resistant goggles may be used to protect the eyes of the cocoa farmer during activities like weeding, harvesting of cocoa pods as well as breaking of pods (Forst et al, 2006).



**Figure 2: Some types and designs of ocular protective devices**

Source: Ace Safety goggles (Available from <http://www.digitup.com.au/safety-goggles-p-50.html>).

*[Trainers should display various form of protective eyewear available to farmers for different jobs. The aim is to make them aware of approved protective eyewear so they can select what best suits their needs for appropriate tasks and to assist them purchase the right kind of devices on the market]*

#### **b. Prescription Glasses (Spectacles)**

It is important to note that normal prescription glasses or spectacles provide inadequate protection from eye injury to the wearer as they tend to splinter on impact (AOA, 2013; OSU, 2004; Wyman, 2000). Spectacle wearers are advised to protect their eyes from potential hazards by wearing protective glasses and flexible or cushion-fitting ventilated plastic goggles that fit over ordinary eyeglasses. Impact and/or chemical resistant goggles or face shields also provide additional protection and is recommended for use over normal glasses (AOA, 2013; OSU, 2004). Spectacle wearers who are uncomfortable with wearing protective eye wear over their prescriptions must have prescription safety glasses designed for them (Good, 2001).

#### **c. Factors to consider before selecting protective eyewear**

Several factors must be considered in selecting protective eyewear some of which are listed below. Protective eyewear should be;

- reasonably comfortable.
- fit comfortably without interfering eye movements or vision of the wearer.

- durable.
- easy to clean.
- capable of being disinfected.
- of industrial quality (Z87.1 logo).

(OSU, 2004:27)

#### **d. Maintenance of protective eyewear**

Maintaining protective eye wear is as important as possessing it. It should be regularly cleaned and repaired where necessary. Do not clean the protective eyewear with any material at all. Use that which has been provided by the manufacturing company or a clean soft cotton material kept for that purpose. Do not leave protective eyewear on the ground or hanging anywhere, rather, store them in a clean, dust-proof container. This will prolong the lifespan of the protective eyewear. However, there is the need for periodic replacements especially when the protective equipment begins to interfere with vision and makes working more difficult as this may predispose farmers to injury rather than prevention (Forst et al, 2006).

#### **e. Misconception and barriers to use of protective eyewear**

Farmers are known to have several misconceptions that prevent the use of ocular protection while working on the farm. Key among these misconceptions is the fact that most report that "eye protection will make them look funny", "co-workers will make fun of them" and "risk of eye injuries is low in agriculture" (Quandt et al, 2012). It is important to place value on the protection received from wearing such devices than the cosmetic appeal. However, devices that offer both ocular protection and cosmetic appeal are commercially available. Farmers are therefore, encouraged to purchase ocular protective devices they are comfortable with and at the same time designed for their specific needs. According to Hurst and Kirby (2004) protective equipment use in the tropics is mostly inapt due to poor maintenance or infrequent change, poor storage as well as poor hygiene. While some of these assertions may be true, they do not justify the non-use of ocular protection among farmers. Farmers must be educated to reject these misconceptions. *[Discuss with participants the inaccuracy in these thoughts and the disadvantages and economic loss when injury occurs due to lack of use of ocular protection due to these misconceptions].*

Farmers equally have the belief that "they do not have control over whether they sustain injuries or die" (Blanco-Munoz and Lacasaña, 2011: 124), which has also been reported to be the reason for the low use of PPEs, their use being seen as a sign of weakness in a cultural context (Blanco-Munoz and Lacasaña, 2011) while others believe that eye may be caused by the "gods" if someone disobeyed them and see little or no reason in using eye protection. These are cultural and religious beliefs that are not scientifically true with regards to the occurrence of eye injuries on the farm and farmers are encouraged to disabuse their minds from such misconceptions. *[Discuss with participants the need to disabuse their minds on these beliefs and concentrate on taking precautionary measures to prevent eye injuries on the farm].*

Several other reasons have been reported as barriers to the use of ocular protection among farmers. These include eye protection interfering with work (visual acuity reduction), discomfort (slipping, fogging), economic (not having funds to purchase protective lenses), ignorance of eye protective device, indiscipline and low education and training (Quandt et al, 2012; Verma et al, 2011; Quandt et al, 2008; Forst et al, 2006; Quandt et al, 2001a). While some of these challenges may be real, it is important to note that with advances in technology, anti-fog protective and relatively comfortable eyewears are available for which reason farmers should not be troubled about the use of such devices. The pain from injuries, as well as, economic loss to the individual and the nation due to inactivity as result of eye injury suffered on the farm, should motivate farmers to overcome their claim of economic challenge in purchasing protective eyewear. *[Farmers should be encouraged to make purchasing and use of protective eyewear a priority as 90% of eye injuries can be prevented with its use. Participants should be helped to overcome these and other barriers if they apply and relate to them].*

#### **4. Common ocular conditions among farming populations**

Some eye conditions have been documented as being prevalent among farmers. It is important that farmers are aware of these conditions and their effects on their visual status. This will motivate them to seek appropriate health interventions to maintain good eye health. Key among these conditions are pterygia, allergic conjunctivitis and other conjunctival infarctions, corneal ulcers/scar, cataract and glaucoma, refractive errors, among others (Boadi-Kusi et al, 2014; Verma et al, 2011; Quandt et al, 2008). *[Participants should be made*

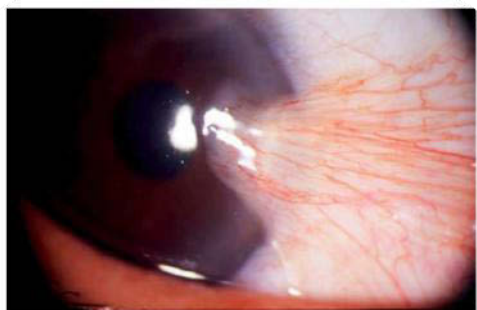
*aware that even a little injury or scratch to the cornea, if not well managed could lead to visual impairment or blindness. Stress the need for uptake of cataract surgery, as it remains the most viable choice of preventing blindness from cataract, the leading cause of avoidable blindness].*

**Refractive Errors:** This condition occurs when the eye cannot clearly focus the images from the outside world. Refractive errors may result in blurred vision, which is sometimes so severe that it causes visual impairment (WHO, 2012). The three major classes of refractive errors are:

- Myopia (shortsightedness): difficulty in seeing distant objects clearly;
- Hyperopia (farsightedness): difficulty in seeing close objects clearly;
- Astigmatism: distorted vision resulting from an irregularly curved cornea;
- Presbyopia: difficulty in reading or seeing at arm's length. This is linked with ageing and occurs almost universally.

Refractive errors are not preventable, but can be diagnosed through an eye examination and managed with corrective glasses, contact lenses or refractive surgery. Presbyopia is usually corrected with reading glasses. *[Trainers must stress that, till date, there is no medical correction of refractive errors, and encourage participants to uptake spectacle corrections when they are prescribed].*

Below are illustrations of some of the ocular conditions described earlier (**Figure 3**).



Pterygium



Acute conjunctival infection



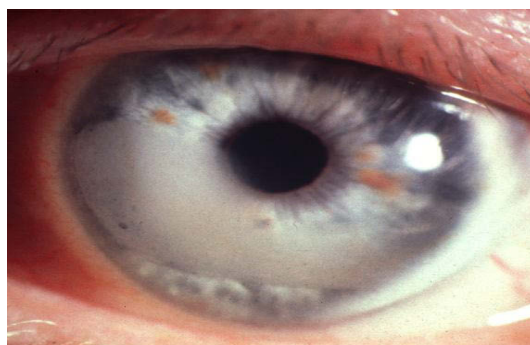
Traumatic eye injury



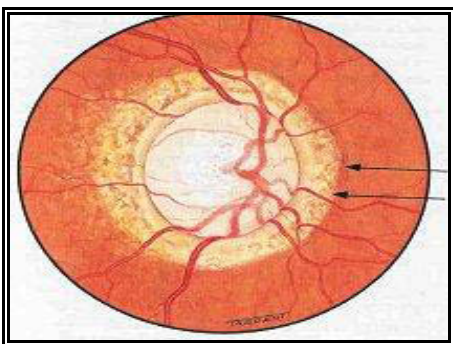
Allergic conjunctivitis



Keratitis/ Subconjunctival haemorrhage



Cornea Opacity



Glaucoma (seen inside the eye)



Cataract

**Figure 3: Some ocular conditions.** Source: Kanski, 2009.

**a. Ocular health seeking behaviour and barriers to seeking eyecare**

Efforts to improve eye health have been hampered by poor ocular health seeking behaviour among farmers (Quandt et al, 2008; 2001). Where ocular health interventions are sought, they are often reported late to the hospital or clinic when very little could be done to remedy the visual status of the person (Ocansey et al, 2014; Quandt et al, 2008). However, the American Optometric Association recommends that every individual should have their first eye examination at 6 months, 3 years and every two years thereafter between 6 to 18 years and beyond (AOA, 2014). The frequency varies in adulthood depending on the condition. *[Participants should be encouraged to seek proper eye care at a hospital or clinic at least once every two years and as and when necessary as their doctor specifies].*

Due to limited eye care facilities and professionals in Ghana (Ilechie et al, 2013) and in other developing countries as well as, cultural and religious beliefs, other alternate sources of eye care seeking such as visiting local chemical shops, use of herbal medicines and consultations with herbalist may be options available to farmers (Ocansey et al, 2014). Although health seeking is not limited to orthodox conventions alone, these alternate sources do not provide adequate eye care for ocular ailments and in most cases may lead to exacerbation of the eye complaints or conditions of farmers. *[Using these forms of eyecare should be discouraged as much as possible among participants. Prompt health seeking at the hospitals and clinics should be encouraged especially when most farmers are registered with the National Health Insurance Scheme. Participants who have not registered should be encouraged to do so].*

Other reasons cited as barriers to the utilization of eyecare services include cost, long distance from the home to hospital, long waiting time at the hospital, lack of health insurance, time constraints, among others. *[Ask participants about other barriers to seeking eye care. Draw participants attention to the fact that spending the little money or making attempts to overcome these and other barriers is worth more than going blind and being unable to work on the farm. Blindfold one participant and request the person to demonstrate an activity they usually undertake on the farm. Discuss the difficulties encountered and relate it to the economic loss due to blindness].*



## **5. Ocular emergencies in farms and basic first aid**

Proper management of eye emergencies on farms is crucial to preserving the vision of farmers upon sustaining ocular injury. It is therefore important that cocoa farmers acquaint themselves with proper first aid techniques. This is important since in most cases, trained staffs who can administer ocular first aid are not available in farms and even in most rural communities to assist when the need arises. The recommended first aid depends upon the type of eye injury sustained. A brief overview of some first aid procedures for common eye injuries is presented below.

### **a. Foreign body in the eye**

This may be a very common occurrence in cocoa farms where objects and particles in the farm environment may get into the eye. When they do happen, DO NOT rub the eye.

Lift the upper eyelid over the lashes of your lower lid. Blink several times and allow natural tears to flush out the particle. If the particle remains, keep your eye closed and seek medical attention (AOA, 2013; OSU, 2004).

For sand or small farm debris, use eyewash to flush the eye; if the debris remains, LOOSELY bandage the eye and visit the clinic/ eye doctor / community health worker.

### **b. Blunt injury**

This may be as a result of blows to the eye which could also occur on cocoa farms, such as a cocoa pod hitting the eye during harvesting. When they occur, GENTLY apply cold compresses (put a clean towel in a cold water/ice cubes and keep at the injured area) for 15 minutes and again each hour as needed to reduce pain and swelling. DO NOT apply any pressure. If the blow was hard enough to cause discoloration, see an eye doctor or a physician or community health worker. Internal damage could have occurred (AOA, 2013; OSU, 2004).

If a light blow occurred with pain or visual disturbance, apply cold compress to reduce pain, and report to the eye doctor/ clinic. Even a light blow can cause a significant eye injury. DO NOT apply herbs on your own accord to the eye.

**c. Penetrating injury**

All penetrating injuries (anything that pierces the eye and remains such as a stick, nail, branch of a tree, etc) to the eye should be examined by an eye care professional or medical practitioner as soon as they occur even if the injury seems minor at first as a severe eye injury is not always immediately evident. On the farm, efforts should be made to get home as quick as possible. Delay in seeking appropriate eye care can cause the damaged areas to worsen and could result in permanent vision loss or blindness.

For all penetrating eye injuries, DO NOT touch, rub or apply pressure to the eye. DO NOT try to remove the object stuck in the eye. Do NOT apply ointment, medication or herbs to the eye. See an eye doctor as soon as possible.

For a cut or puncture wound, GENTLY place a shield over the eye. Where appropriate shields are not available in the farm, the bottom of a paper cup taped (or its equivalent such as two pieces of wood gently covered with a clean cloth and bandaged around the head) to the bones surrounding the eye can serve as a shield until you get medical attention. DO NOT rinse with water. DO NOT remove the object stuck in the eye. DO NOT rub or apply pressure to the eye. See an eye doctor/ medical doctor immediately after shielding the eye.

Note that the use of drugs such as *aspirin*, *ibuprofen* or other *non-steroidal and anti-inflammatory drugs* is not recommended in such instances. These drugs may increase bleeding due to their effect on thinning the blood.

(AOA, 2013; OSU, 2004).

**d. Chemical injury**

Chemical burns on the eye occur in the farm mostly during mixing, loading and application of pesticides and other commonly used chemicals. When such injuries occur, CONTINUOUSLY flushed the eye with water for at least 15 minutes. DO NOT put anything else in the eye. Report to an eye doctor or medical doctor and take the label or container of the chemical involved.

Note that wherever chemicals are used, fresh water should be available for irrigating the eyes should it get into contact with the eye.

#### **i. Eye flushing technique**

It is important to appropriately carry out the eye flushing out technique when the eye gets into contact with chemicals. Farmers could easily carry out the procedure to quickly decontaminate their eyes. To do this;

- Use an eyewash fountain or pour water into your eyes, holding the eye open while flushing the pesticide out.
- Move your eyeball and eyelid and flush for at least 15 minutes.
- Get medical help immediately (Chau et al, 2012)

This procedure is same for sand and small debris, but more intense in the case of chemical injury.

(AOA, 2013, Peate, 2007; ASU, 2004)

#### **ii. Handling Chemicals**

Chemical eye injuries could be potentially blinding. Due to the increased use of chemicals on cocoa farms, it is important to observe some basic rules so as to reduce the occurrence of eye injuries from this source.

- Always read and understand labels on chemicals to ensure that you are aware of the potential skin and inhalation hazards. If you cannot read, get help from a colleague.
- Do not store chemicals under the sun, as pressure will build up and spilt into your face an eye when it is opened without caution.
- Clean up small chemical spills immediately if you can do it safely.
- Always wear a complete ocular protection when opening chemical containers, mixing, loading and applying chemicals.
- Wear chemical resistant gloves and protective clothing protection when handling chemicals to ensure that the skin is well protected.
- Do not touch your eyes with hands that are contaminated with chemicals.
- Thoroughly wash your hands and face after handling chemical.

*[NB: for any other injury not mentioned in this manual, the immediate goal is to save the eye from going blind. Participants should be encouraged to seek appropriate medical attention as soon as practicable. Encourage participants to keep simple first aid boxes in their farm. It will be useful in times of injury. The use of local chemical shops should not be an end in seeking help, but seen as a first aid as attendants are mostly not trained to manage eye conditions and injuries. The use of herbal medicines and consultations with specialized traditional healers as a means of ocular health seeking should also be discouraged as practitioners are not trained to deal with such emergencies. The use of such alternate eye care seeking, in most cases, delays the process of seeking appropriate eye care which could lead to blindness in the affected eye].*

## **6. Stress on the Farm**

Stress is a person's reaction to something considered a challenge or a threat. It can also be described as an emotional strain and pressure exerted on mental and physical being by oneself and others and can alter the way a person feels, thinks and behaves (OSU, 2004; Cox et al, 2000). Stress in the farm could arise from several causes such as pest invasion, poor yields of crops, lack of funds to purchase farm inputs, inadequate labour, among others.

In farms, a lack of concentration due to stress may result in poor decisions leading to poor body coordination. This can be dangerous when working with tools or chemicals which have the potential to cause eye injury. Do not handle chemicals or dangerous equipment if you are stressed, as a moment of mistake could lead to injuries with severe implication for eye health. It is also important to schedule your time realistically and allow for flexibility with work. Do not squeeze more work into a day than can be completed. Take occasional short breaks from work as a few minutes off the job, will provide a refreshing start when you resume work. Learn how to relax and share your frustrations with others to calm you down when stressed. It is important to note that, work-related stress does not only lead to ocular injuries, but could also be a cause of other systemic conditions such as hypertension which has implications for the eye. Every effort should therefore be made to reduce work-related stress.

## **7. General consideration for prevention of eye injuries in the farm and maintaining eye health**

Farmers are encouraged to work within their capabilities and strengths. A lot of farm accidents leading to ocular injuries are as a result of exceeding personal limits and attempting jobs that are beyond ones physical strengths. Poor planning of task undertaken in the farm is also a contributing factor to the occurrence of ocular injuries. Farmers are therefore, encouraged to prepare and gather all needed tools, ensure they are well maintained, and appropriate protective equipment gathered before initiating tasks. Proper planning will ensure that break periods are observed, and adequate rest obtained to reduce fatigue and risk to ocular injury and other parts of the body. Proper planning of task also entails considering your age and general health status to decide which activities you can undertake safely. It is important to seek help when there is the need to do so. This will reduce or prevent the occurrence of injury.

Apart from injury prevention on the farm, farmers are encouraged to maintain healthy eyes. This involves taking healthy foods and vegetables that provide adequate nourishment to maintain good eyes, regular and prompt visit to the hospital for check-ups, and sticking to the advice of doctors. These are important as injury prevention alone, without controlling for other eye disorders that can potentially impair or blind farmers will imply that they cannot undertake their activities to their full potential or reduce productivity, with implications for the individual, his family and the national economy (Pitts and Kleinstein, 1993).

### **Part 3: SIMULATION EXERCISES**

These exercises are set to encourage participatory discussions and to reinforce the learning process. This should be done in small groups to encourage active participation of all trainees (Hurst and Kirby, 2004). Trainers are to explain scenarios and guide trainees in the discussions. Trainers must not criticize participants on their contributions and suggestions but guide the discussion to achieve the set goals.

#### **Exercise 1: Ocular safety and health**

##### **Objective**

To discuss ocular health and safety issues on cocoa farms with negative implication for the farmer's eyes.

##### **Teaching Aids**

Projector

Laptop

Marker

Flip chart

Case scenario

##### **Time: 30 minutes**

##### **Procedure**

Read the case to participants 3 times (translate to their preferred local language) to enhance proper understanding. Ask a participant to narrate the story to others.

##### **Case Study**

Kojo owns a large cocoa farm; pests had invaded a portion of his farm so he arranged with four labourers to help spray his farm the following morning. On the said morning, Kojo, his wife and five children went to the farm. The labourers who were to spray the farm joined them not long after Kojo and his family had arrived on the farm.

The four labourers asked for the chemicals they were to use in spraying the farm. Kojo brought the chemicals and immediately, the labourers began mixing and loading the chemicals into the spraying machine. After mixing and loading, the labourers began spraying the portion of the farm that was invaded by pests. Only one of the labourers, Musa, wore a pair of goggles which he removed and wore over his forehead about 15 minutes after he had begun spraying.

While the labourers were spraying one part of the farm, Kojo's wife and one child were weeding; Kojo and two of the children were plucking cocoa pods from the tree and gathering them while the other two children were breaking the pods at another location.

Two hours after working, one of the labourers who were involved in spraying Kweku, who had returned to refill his machine spilt a chemical into his right eye. He shouted for help and one of his colleagues came to his aid. He quickly got water for him to wash his face. Because his eye was red, he decided to sit under a cocoa tree and wait for the others to finish so they could go home together. By the time the labourers got home at about 12.00 noon, the pain and irritation in the eye of Kweku had subsided so he did not seek any medical intervention.

Kojo and his family worked throughout the day in the scorching sun and only had about 15 minutes break for lunch. Close to the end of the day when they were all exhausted, one of the children, Kwame, who was helping in breaking the pods, was hit in the eye by a husk from a just broken pod. He shouted, closed his eye for some minutes and continued to finish his task for the day.

The family closed from the farm at 5.15pm and returned home. After three days, Kwame's vision in the eye which was hit by the husk began to reduce so he reported to the chemical shop and was given eye medication.

**Guide for discussion**

1. What safety measures could the labourers have taken in mixing, loading and spraying?
2. What would you say about the safety attitude of Musa?
3. What possible reasons could have accounted for Musa's behaviour with his goggles?
4. Should Kojo and his family have been on the farm at the time the spraying was going on?
5. What are the possible effects of their presence on their eye?
6. Should they have worn ocular protection while weeding, plucking pods and breaking pods?
7. What appropriate first aid should have been administered?
8. Should Kweku have sought medical intervention after getting home or immediately the accident occurred?
9. Which possible places could he have sought help?
10. What immediate action should have been taken by Kwame?
11. Which place would have been ideal for Kwame to have sought medication?
12. Identify all the possible ocular hazards on the farm and discuss their implications.



## **Exercise 2a: Basic Ocular First Aid: Chemical injury**

### **Teaching Aids**

Projector

Laptop

Bowl

Water

Towel

Case scenario

**Time allowed: 20minutes**

### **Objective**

To demonstrate the flush out technique following chemical injury

### **Procedure**

Read the case to participants 3 times (translate to their preferred local language) to enhance proper understanding. Ask a participant to narrate the story to others.

### **Case study**

Kofi normally sprays his cocoa farm with pesticides. On one occasion, while he was getting ready to spray his farm, the chemical accidentally spilled in his eyes while he was opening the cork of the chemical container which he had kept in the sun for a long time. Demonstrate [discuss] how you will carry out the flushing technique for Kofi if you were the only person available on the farm with him.

### **Guide for discussion**

1. What could Kofi have done to prevent the pesticide from spilling in his eyes?
2. Steps in carrying out the eye flushing technique [Demonstrate procedure]
  - a. Use an eyewash fountain or pour water into your eyes, holding the eye open while flushing the pesticide out. [decontaminate your eyes from the chemical]
  - b. Move your eyeball and eyelid and flush for at least 15 minutes.
  - c. Get medical help immediately.

## **Exercise 2b: Basic first aid: Penetrating injury**

### **Teaching Aids**

Projector

Laptop

Marker

Flip chart

Case scenario

**Time allowed: 20minutes**

### **Procedure**

Read the case to participants 3 times (translate to their preferred local language) to enhance proper understanding. Ask a participant to narrate the story to others.

### **Case study**

Yaw and his family visited their cocoa farm one morning. While they were weeding a sharp foreign object suddenly entered the left eye of his youngest child after his machete hit a loose stone. The object pierced the eye and remained stuck. Work came to an abrupt end as each of the family members tried to figure out what they could do to help. Yaw sent one of his children to quickly fetch water. Yaw immediately flushed the injured eye with water and attempted to remove the foreign object but was not successful. Because of severe pains in the injured eye, Yaw rushed his child home and reported to the chemical shop for assistance. He was given medication which helped reduce the pain. Yaw took the child to the nearest hospital the following morning, only to be told by the eye doctor that the left eye of his child could no longer see. The child was admitted, treated and discharged after one week.

### **Guide for discussion**

1. Could Yaw and his family have taken any safety precaution while they were weeding?
2. Does the situation of running around to figure out what could be done suggest the need for a first aid box on the farm?

3. Do you agree to the eye flushing technique performed by Yaw on his child? Give reasons.
4. Should Yaw have attempted removal of the foreign object?
5. Did Yaw do well by rushing his child home?
6. Do you think Yaw should have visited the chemical shop?
7. What do you think might have accounted for the loss of vision in the affected eye of the child?

### **Exercise 3: Identification of potential hazards**

#### **Objective**

To identify and discuss potential ocular health hazards on cocoa farms

#### **Teaching Aids**

Projector

Laptop

Marker

Flip chart

Case scenario

#### **Time: 30 minutes**

#### **Procedure**

Read the case to participants 3 times (translate to their preferred local language) to enhance proper understanding. Ask a participant to narrate the story to others.

#### **Case Study**

Kofi and his children went to their cocoa farm to harvest cocoa pods one morning. Kofi and his elder son prepared their harvesting hooks and started work while the other children gathered the fruits. Occasionally, Kofi had particles fallen in his eyes which he rubbed with his hand and continued to work. After about 1 hour, a branch fell from the top of one cocoa tree although Kofi managed to escape without getting hurt. Unfortunately for Kofi, while harvesting, his harvesting hook went off and fell together with a pod he had harvested. Although he managed to escape harm from the hook, the pod hit his eye as a result of which he sustained minor injuries to the right eye. He used herbs to treat the injury and closed for the day.

#### **Guide for discussion**

1. Identify all the potential ocular hazards that could have harmed Kofi on the said day.
2. Discuss how each hazard could have harmed Kofi's eye.
3. Could Kofi have avoided his harvesting hook fallen off?

4. What safety measures could have been put in place to avoid the ocular injury?
5. Was the use of herbs appropriate?
6. What is your reaction about rubbing of the eye when particles fall on it?

## Lesson Planner

SAMPLE LESSON PLANNING SHEET FOR TRAINERS		
Name of session:		
Target group:		
Time available:		
Requirements:		
CONTENT	TEACHING TECHNIQUES	TEACHING AIDS
Aim		
Introduction		
Core points of the text		
Points to remember		
Summary		
Activities		

**Source:** (Hurst and Kirby, 2004)

## Evaluation questionnaire

STATEMENT
<b>Basic knowledge about eye health, hazards and Safety</b>
1. I have basic knowledge about the structure of the human eye
2. I am supposed to seek eye care at least once every two years
3. Exposure to pesticides and other chemicals can cause eye problems
4. Eating green leafy vegetables and carrots can help keep my eye healthy
5. Alcohol intake has no effect on my eyes
6. Smoking can affect my eyes
7. Early entry of sprayed farms cannot cause eye irritation
8. Radiations from the sun cannot cause cataracts
9. Excessive exposure to the sun radiations can cause eye problems
10. Wind, dust, and sand can cause eye problems
<b>Perceptions and risk beliefs</b>
11. Infections can be transmitted from plant to my eyes to cause diseases
12. Eye injuries are always avoidable or preventable when working on the farms.
13. My chance of getting an eye injury at work on any given day is very low
14. Safety glasses help protect the eyes when working in agriculture
15. I often risk injury to my eyes in order to save time or to get more work done.
16. I think that eye protection would make me look funny.
17. I believe that eye injuries are sometimes caused by the gods if one disobeys them.
18. I change my protective eyewear only when I have money to purchase one
19. I think purchasing protective eyewear frequently is a waste of resources
20. I often see my co-workers doing something that is risky for their eyes.
<b>Injury and potential hazards</b>
21. I am well informed on preventing eye injuries in the farm
22. There are many jobs in agriculture where a worker does not need to wear safety glasses.
23. Taking a rest when tired can help reduce injury
24. I should consider my age before performing a task on the farm
25. I must wear ocular protection for every activity on the farm that has potential for causing injury
26. All farm tools can cause injury to my eye
27. Branches, vines, bushes and thorns can cause injury to my eye
28. Flying objects can cause injury to the eye
29. There is potential for eye injury in any activity I undertake in the farm
30. Injury to the eye can lead to blindness

<b>Protection</b>
31. There are several types of ocular protection available to farmers apart from the "traditional goggles".
32. If my protective eyewear is old and I cannot afford a new one, I will continue using the old one
33. If I lost my safety glasses but need to do a job that is hazardous to my eyes it is important to get another pair before doing that job
34. I must wear eye protection whenever I am spraying with chemicals
35. It is important to wear safety glasses all the time while working on the farm.
36. Spectacle wearers need additional ocular protection when working in the farm
37. Hats can reduce the amount of sun radiation getting into my eye
38. Sunglasses provide protection to the eye when working in the farm
39. I can wear sunglasses to reduce the amount of sun radiation entering my eye
40. I consider the quality of protective eyewear before purchasing
<b>First Aid</b>
41. If I get something in my eye, like a piece of sand, I should immediately wash it with clean water
42. If I splash my eyes with chemicals, the first thing I should do is wash my eyes out with clean water
43. If I get a cut or puncture in my eye, I can wash it with water
44. If I get a cut or puncture to my eye, I have to bandage it and see a physician immediately
45. I am not allowed to rub my eyes if particles fall in it
46. I can apply herbs if I sustain an eye injury
47. If I get a blow to the eye, I can apply cold compresses
48. If I get a blow to the eye hard enough to cause discoloration, I am supposed to see a physician.
49. I can purchase eye medication from the chemical shop when I have an eye disease or injury
50. It is important for me to get a first aid box in the farm
<b>OTHER EVALUATION QUESTIONS (SHORTER VERSION)</b>
1. Did the training meet its aim and objective? <span style="float: right;"><input type="checkbox"/> Yes <input type="checkbox"/> No</span>
2. Did the course address your ocular health needs? <span style="float: right;"><input type="checkbox"/> Yes <input type="checkbox"/> No</span>
3. How beneficial I was this training? <span style="float: right;"><input type="checkbox"/> Very beneficial <input type="checkbox"/> Beneficial <input type="checkbox"/> Not beneficial</span>
4. How often would you recommend such trainings? <span style="float: right;"><input type="checkbox"/> Very often <input type="checkbox"/> Often <input type="checkbox"/> Not often</span>
5. Do you have any particular ocular health challenges that were not addressed adequately in this training? <span style="float: right;"><input type="checkbox"/> No <input type="checkbox"/> Yes (specify).....</span>
6. Do you have any suggestions to improve future trainings? If so explain

*NB: Trainers may utilize the above questionnaires and ask participants to respond to a dichotomous answers [Strongly agree or strongly disagree] or allow participants to chose from a scale of 5 likert answers [Strongly agree (5), Agree (4), Neutral (3), Disagree (2) and strongly disagree (1)] for questions 1-50. Where necessary, trainers may adopt different evaluation methods (Shorter versions).*



## References

- American Optometric Association (AOA). Protecting your eyes at work. 2013. Available at: <http://www.aoa.org/patients-and-public/caring-for-your-vision/protecting-your-vision?sso=y> (accessed 12 Jan 2013).
- American Optometric Association (AOA). Recommended Eye Examination Frequency for Pediatric Patients and Adults. 2014. Available at: <http://www.aoa.org/patients-and-public/caring-for-your-vision/comprehensive-eye-and-vision-examination/recommended-examination-frequency-for-pediatric-patients-and-adults> (accessed 1 May 2013).
- Asuming-Brempong S, Sarpong DB, Asenso-Okyere K, Amoo P. Labour practices in cocoa production in Ghana (pilot survey), 2006. Available at: <http://www.aktiv-gegen-kinderarbeit.de> (accessed 3 July 2011).
- Aw TC, Gardiner K, Harrington JM. *Occupational health*, 5th Ed. Oxford: Blackwell Pub, 2007.
- Banjo AD, Aina SA, Rije OI. Farmers' Knowledge and Perception Towards Herbicides and Pesticides Usage in Fadama Area of Okun-Owa, Ogun State of Nigeria. *Afr J Basic Appl Sci*. 2010; 2(5-6): 188-194.
- Bartlett JD, Jaanus SD. *Clinical Ocular Pharmacology*. 4th ed. Boston, Mass: Butterworth-Heinmann Publishing; 2001.
- Blanco-Muñoz J, Lacasaña M. Practices in Pesticide Handling and the Use of Personal Protective Equipment in Mexican Agricultural Workers. *J Agromed*, 2011;16(2): 117-126.
- Boadi-Kusi SB, Hansraj R, Kumi-Kyereme A, Mashige KP, Awusabo-Asare K, Ocansey S, Kyei S. Ocular Health Assessment of Cocoa Farmers in a Rural Community in Ghana, *J Agromed*. 2014; 19 (2): 171-180.
- Bradberry SM, Proudfoot AT, Vale JA. Glyphosate poisoning. *Toxicol Rev*. 2004; 23: 159-167.
- Burton J. WHO Healthy Workplace Framework and Model: Background Document and Supporting Literature and Practices. Geneva, Switzerland. 2010 Available at: [http://www.whoindia.org/LinkFiles/Health\\_Promotion\\_Health\\_Promotion\\_Powering\\_India%27s\\_Growth.pdf](http://www.whoindia.org/LinkFiles/Health_Promotion_Health_Promotion_Powering_India%27s_Growth.pdf) (accessed 29 May 2011).
- Carson HG. *Environmental and Occupational Optometry*. London: Butterworth Heinemann Publications, 2009.
- Centers for Disease Control [CDC]. Update: hydrogen cyanamide- related illnesses—Italy, 2002–2004. *MMWR*, 2005; 54: 405–408.

- Chau JP, Lee DT, Lo SH. A systematic review of methods of eye irrigation for adults and children with ocular chemical burns. *Worldviews Evidence-based Nurs*, 2012, 9(3): 129-138.
- Chen S, Bartolucci AA, Bae S, Singh PK. Associating Risk Factors with Farm Injuries Using Classification Tree University of North Texas Health Science Center, 2007 Available at: <http://www.stats.gov.cn/english/icas/papers/P020071114297552340662.pdf> (accessed 21 May 2013).
- Ciesielski S, Loomis DP, Mims SR, Auer A. Pesticide exposures, cholinesterase depression, and symptoms among North Carolina migrant farmworkers. *Am J Public Health*. 1994; 84: 446–451.
- Commonwealth of Australia (COA). Eye health in the workplace- A guide for PCBU's and workers, 2012. Available at: [http://www.comcare.gov.au/\\_\\_data/assets/pdf\\_file/0016/71215/Eye\\_health\\_in\\_the\\_workplace\\_-\\_a\\_guide\\_for\\_PCBU's\\_and\\_workers.pdf](http://www.comcare.gov.au/__data/assets/pdf_file/0016/71215/Eye_health_in_the_workplace_-_a_guide_for_PCBU's_and_workers.pdf) (accessed 12 April 2013).
- Cox T, Griffiths A, Rial-González E. Research on work-related stress. European Agency for Safety and Health at Work Luxembourg: Office for Official Publications of the European Communities, 2000. Available at: <https://osha.europa.eu/en/publications/reports/203> (accessed 3 July 2013).
- Echobichon DJ. Toxic effects of pesticides. In: Klassen CD, Doull J editors. Cassarett and Doull's Toxicology. New York: McGraw-Hill, 1996; 643–689.
- Forst L, Noth IM, Lacey S, Bauer S, Skinner S, Petrea R, Zandoni J. Barriers and benefits of protective eyewear use by Latino farm workers. *J Agromed*, 2006; 11(2): 11-7.
- Geigle S. Safety supervision and leadership – OSHAcademy course 712 study guide. Geigle Safety Group Inc, 2000. Available at: <http://www.oshatrain.org/courses/studyguides/712studyguide.pdf> (accessed 3 May 2012).
- Good GW. Occupational vision manual-American Optometric Association, 2001. Available at: [www.aoa.org](http://www.aoa.org) (accessed 12 May 2013).
- Hurst P, Kirby P. Health, Safety and Environment: A Series of Trade Union Education Manuals for Agricultural Workers. International Training Centre of the ILO, Matteo Montesano, Desktop Publishing: Paola Bissaca, 2004. Available at: [http://www.ilo.org/wcmsp5/groups/public/@ed\\_dialogue/@actrav/documents/publication/wcms\\_111413.pdf](http://www.ilo.org/wcmsp5/groups/public/@ed_dialogue/@actrav/documents/publication/wcms_111413.pdf) (accessed 7 May 2013).

- Ilechie AA, Otchere H, Darko-Takyi C, Abraham CH. Access to and Utilization of eye Care Services in Ghana. *Int J Health Res*, 2013; 6(3): 7-15.
- International Labour Organisation [ILO]. World Day for Safety and Health at Work: A Background Paper. Geneva: International Labour Office, 2005. Available at: [http://www.ilo.org/public/english/bureau/inf/download/sh\\_background.pdf](http://www.ilo.org/public/english/bureau/inf/download/sh_background.pdf) (accessed November 10, 2011). <http://www.ilo.org/ilolex/english/convdisp1.htm> (accessed 8 April, 2013).
- International Labour Organization. Convention 184. Convention concerning Safety and health in agriculture. 2001. Available at: <http://www.ilo.org/public/english/standards/relm/ilc/ilc89/pdf/c184.pdf>. (accessed 22 Jan 2012).
- Jaga K, Dharmani C. Ocular Toxicity from Pesticide Exposure: A Recent Review. *Environ Health Prev Med*, 2006; 11: 102–107.
- Johnson GJ. The environment and the eye. *Eye*. 2004; 18(12): 1235-1250.
- Kanski JJ. *Clinical Ophthalmology-a synopsis*. London: Butterworth Heinemann Elsevier limited, 2<sup>nd</sup> Ed, 2009.
- Klein BE, Klein R, Linton KL, Franke T. Cigarette smoking and lens opacities: the Beaver Dam Eye Study. *Am J Prev Med*. 1993; 9: 27- 30.
- Kolozsvári L, No'gra'di A, Hopp B, Bor Z. UV Absorbance of the Human Cornea in the 240- to 400-nm Range. *IOVS*. 2002; 43 (7): 2165 – 2168.
- Lacey SE, Forst LS, Petrea RE, Conroy LM. Eye injury in migrant farm workers and suggested hazard controls. *J Agric Saf Health*, 2007; 13(3): 259-274.
- Liebman KA, Augustave W. Agricultural Health and Safety: Incorporating the Worker Perspective. *J Agromed*, 2010; 15(3): 192-199.
- Lipscomb H. Effectiveness of interventions to prevent work-related eye injuries. *Am J Prev Med*. 2010; 18(4S), 27-32.
- Lu JL. Risk factors to pesticide exposure and associated health symptoms among cut-flower farmers. *Int J Environ Health Res*. 2005; 15:161–169.
- Mahmoud BL, Shady AM, El Meleegy UAG, Mona A. Soliman Effects of Ultraviolet B Radiation on the Cornea of Adult Male Albino Rats and the Possible Role of Lornoxicam: A Histological, Immunohistochemical and Morphometrical Study. *Egypt J Histo*. 2010; 33(1): 156 -167.

- Maltais V. Risk Factors Associated with Farm Injuries in Canada 1991-2001 Statistics Canada – Agricultural Division- Catalogue no. 21-601-MIE. 2007.
- McCall BP, Horwitz B, Taylor OA. Occupational eye injury and risk reduction: Kentucky workers' compensation claim analysis 1994–2003. *Injury Prev.* 2009;15:176–182. doi:10.1136/ip.2008.020024.
- Mckeag D, Maini R, Taylor HR. The ocular surface toxicity of paraquat. *Br J Ophthalmol.* 2002; 86: 350–351.
- Muillerman S. 2013. Occupational Safety and Health on Ghanaian cocoa farms. Baseline report. Sustainable Tree Crops Program, International Institute of Tropical Agriculture (IITA), Accra, Ghana.
- Ocansey S, Kyei S, Gyedu BN, Awuah A. Eye care seeking behaviour: a study of the people of Cape Coast Metropolis of Ghana. *J Behav Health*, 2014; 3(2): 101-106.
- Oregon State University (OSU), College of Agricultural Sciences, Health and Safety Training Manual, 2004.
- Oshika T. Ocular adverse effects of neuropsychiatric agents: incidence and management. *Drug Safety.* 1995; 12: 256-63.
- Peate WF. Work-related eye injuries and illnesses. *Am Fam Physician*, 2007; 75(7): 1017-22.
- Pitts DG, Kleinstein RN. *Environmental Vision*. Boston:Butterworth-Heinemann, 1993.
- Quandt SA, Elmore RC, Arcury AT, Norton D. Eye symptoms and eye protection use by seasonal and migrant farmworkers. *South Med J.* 2001; 94, 603–607.
- Quandt AS, Feldman RS, Vallejos MQ, Schulz RM, Verma A, Fleischer, BA, Arcury AT. Vision Problems, Eye Care History, and Ocular Protection among Migrant Farmworkers. *Arch Env Occup Health*, 2008; 63(1), 13- 6.
- Quandt AS, Schulz RM, Talton WJ, Verma A, Arcury AT. Occupational Eye Injuries Experienced by Migrant Farmworkers, *J Agromed*, 2012; 17(1), 63-69.
- Retzlaff C, Hopewell J. Puntos de Vista: Primary Eye Care in Migrant Health - Eye Care Needs Assessment [MCN Monograph Series]. Austin, TX: Migrant Clinicians Network, 1996.
- Salvatore AL, Bradman A, Castorina R, Camacho J, Lopez J Barr DB, Snyder J, Jewell NP, Eskenazi B. Occupational behaviors and farmworkers' pesticide exposure: findings from a study in Monterey County, California. *Am J Ind Med.* 2008;51:782–794.

- Sancho-Tello M, Muriach M, Barcia J, Bosch-Morell F, Genovés JM, Sasson RF, Wise JB, Watson JJ. Alcoholism and colour vision: Are there family links? *Lancet*. 1970; 2; 367-368.
- Shashikala P, Sadiqulla M, Shivakumar D, Prakash KH. Profile of ocular trauma in industries-related hospital. *Indian J Occup Environ Med*. 2013; 17(2): 66–70. doi: 10.4103/0019-5278.123168
- Shen M, Wang Y, Yang S, Du Y, Xiang H, Stallones L. Agricultural exposures and farm-related injuries among adolescents in rural China. *Injury Prev*, 2013; 19(3): 214-217.
- Sprince NL, Zwerling C, Whitten PS, Lynch CF, Burmeister LF, Gillette PP, Thu K, Alavanja MCR. Farm Activities Associated with Eye Injuries in the Agricultural Health Study. *J Agromed*, 2008; 13(1): 17 – 22.
- Strong LL, Thompson B, Coronado GD, Griffith WC, Vigoren EM, Islas I. Health symptoms and exposure to organophosphate pesticides in farmworkers. *Am J Ind Med*. 2004; 46: 599–606.
- Strong LL, Thompson B, Koepsell TD, Meischke H. Factors associated with pesticide safety practices in farmworkers. *Am J Indust Med*. 2008;51: 69–81.
- Sullivan JB Jr, Blose J. Organophosphate and carbamate insecticides. In: Sullivan JB, Krieger GR editors. Hazardous Materials Toxicology: *Clinical Principles of Environmental Health*. Baltimore, Maryland: Williams and Wilkins, 1992.
- Taylor HR, Pezzullo ML, Keeffe JE. The economic impact and cost of visual impairment in Australia. *Br J Ophthalmol*. 2006; 90 :272–275. doi: 10.1136/bjo.2005.080986.
- Tettey S, Ogoe M, Sonii D. Preventing and Reducing Injuries and Ill Health in Cocoa Production. Learning about Sustainable Cocoa Production: A Guide for Participatory Farmer Training, manual no. 4, 2009.
- Thompson GJ, Mollan SP. Occupational eye injuries: a continuing problem. *Occup Med*, 2009;59:123–125.
- Threlfall TJ, English DR. Sun exposure and pterygium of the eye: a dose–response curve. *Am J Ophthalmol*. 1999; 128: 280–287.
- Verma A, Schulz RM, Quandt AS, Robinson NE, Grzywacz GJ, Chen H, Arcury AT. Eye Health and Safety among Latino Farmworkers, *J Agromed*, 2011; 16 (2), 143-152.
- Verma A. Visual Impairment and Eye Health and Safety among Latino Farmworkers. University of North Carolina at Greensboro, dissertation.2010. Available at: [http://libres.uncg.edu/ir/uncg/f/Verma\\_uncg\\_0154D\\_1079.pdf](http://libres.uncg.edu/ir/uncg/f/Verma_uncg_0154D_1079.pdf) (accessed 22 June 2012).

World Health Organization. Global data on visual impairments- 2010. Geneva, Switzerland, WHO/NMH/PBD/12.01- 2012. Available at: <http://www.who.int/blindness/GLOBALDATAFINALforweb.pdf?ua=1>(accessed 12 June 2013).

World Health Organization [WHO]. Healthy workplaces: a model for action for employers, workers, policy-makers and practitioners. Geneva, World Health Organization. 2010.

Wyman JR. *Safety and the security professional: a guide to occupational safety and health strategies*. Melbourne: Butterworth Heinemann. 2000.