

Society, Biology

SBHA

& Human Affairs

Society, Biology and Human Affairs applies the Attribution Non-Commercial Share Alike 3.0 Unported (CC-BY-NC-SA 3.0) License <http://creativecommons.org/licenses/by-nc-sa/3.0/> to all works it publishes. Under the CC BY-NC-SA 3.0, authors retain ownership of the copyright for their work, but authors allow anyone to copy, distribute, transmit and adapt their work for non-commercial purposes, so long as the original authors and source are cited and the resulting work is distributed only under the same or similar license to this one.

Society, Biology and Human Affairs Notice and Takedown Policy:

If you are a rights owner and are concerned that you have found material, for which you are the rights owner, on our website and you have not given permission, please contact us in writing stating the following:

1. Your contact details
2. The full bibliographic details of the material
3. The URL of the item
4. A statement that, under penalty of perjury, you are the rights owner or are authorised to act for the rights owner.

Please send to:

Society, Biology and Human Affairs, Editor
Department of Anthropology
Durham University
Dawson Building, South Road
Durham, DH1 3LE
United Kingdom

SBHA_editor@biosocsoc.org

The 'Notice and Takedown' procedure is then invoked as follows:

1. *Society, Biology and Human Affairs* will acknowledge receipt of your complaint by email or letter and will make an initial assessment of the validity and plausibility of the complaint.
2. The material will be temporarily removed from the *Society, Biology and Human Affairs*' website pending an agreed solution.
3. *Society, Biology and Human Affairs* will contact the contributor who submitted the material. The contributor will be notified that the material is subject to a complaint, under what allegations, and will be encouraged to assuage the complaints concerned.
4. The complainant and the contributor will be encouraged to resolve the issue swiftly and amicably and to satisfaction of both parties, with the following possible outcomes:
 - a) The material is replaced on the *Society, Biology and Human Affairs*' website unchanged.
 - b) The material is replaced on the *Society, Biology and Human Affairs*' website with changes.
 - c) The material is permanently removed from the website.
5. If the contributor and the complainant are unable to agree a solution, the material will remain unavailable through the *Society, Biology and Human Affairs*' website until a time when a resolution has been reached.

Society, Biology and Human Affairs
ISSN 2046-0058

Ocular conditions among women involved in palm kernel oil processing in the Cape Coast Metropolis, Ghana

Augustine Tanle¹, AA Ilechie², Kofi Awusabo-Asare¹, GO Oveneri² and M Anderson²

¹ Department of Population and Health, University of Cape Coast, Cape Coast, Ghana

² Department of Optometry, University of Cape Coast, Ghana

Email: augtanle@yahoo.com

Abstract

Background: While pro-poor economic activities have provided employment to poor and vulnerable groups in a number of African countries, some of the activities expose those involved to occupational hazards but these hazards are rarely discussed. One of such activities is oil palm kernel processing with its associated exposure to heat with consequences for ocular health. The paper explores the implications of oil palm kernel processing for the ocular health of the women involved in the industry in the Cape Coast Metropolis in the Central Region of Ghana.

Methods: The study involved a survey, in-depth interviews and a Standard ophthalmic examination was carried out on 100 women aged 13 years and above some of whom had been in palm kernel oil processing for ten years or more. The participants were those who were available and willing to participate in the research.

Results: The most commonly reported ocular complaints were itching (20.0%), red and painful eyes (13.0%) and blurred vision at distance (13.0%). Among the ocular diseases identified were chronic conjunctivitis (21.0%), pterygium (11.0%) and cataract (8.0%). The prevalence of suspected glaucoma (C/D > 0.5) was about 3% while the prevalence of visual impairment (VA ≤ 6/18 in the better eye) was 24%. Only 22% of the impairment observed could be attributed to hazards associated with the job.

Conclusions: The processes involved in the palm kernel oil business predispose women to risk of eye diseases. Provision of eye and vision care services at regular intervals could reduce the magnitude and severity of ocular problems associated with this industry.

Keywords: Women, occupational hazards, palm kernel oil processing, ocular condition, Cape Coast

Tanle, A, AA Ilechie, K Awusabo-Asare, GO Oveneri, M Anderson. (2011) Ocular conditions among women involved in palm kernel oil processing in the Cape Coast Metropolis, Ghana. *SBHA* 76(2): 25-40

http://www.biosocsoc.org/sbha/resources/76_2/SBHA_76_2_Tanle_et_al.pdf

Copyright: © 2011 Tanle et al.. This is an open-access article distributed under the terms of the Creative Commons Attribution Non-Commercial Share-Alike 3.0 Unported License

Introduction

In sub-Saharan Africa, over 50 per cent of women are engaged in various economic activities in the informal economy as a means of earning a living (Amu, 2005). One of such activities is palm kernel oil processing, particularly among vulnerable women in urban areas. While these activities have provided employment to such women, the opportunity costs to their health are rarely discussed. The processing of palm kernel oil involves long hours in the sun winnowing, removing particles, roasting the kernels or heating paste from the kernel to produce oil. Firewood and shells of the palm kernel are used as fuel in the processing. These activities are also undertaken in areas where sanitation tends to be poor (Awusabo-Asare and Tanle, 2008). Furthermore, excessive heat, sun and dust have been implicated in degenerative ocular conditions such as pterygium, pingueculae (Newell, 1992). Thus, the conditions under which the processing of the oil take place can generate or aggravate existing ocular health. For instance, pre-existing ocular conditions such as trachoma and conjunctivitis could be aggravated with prolonged exposure to smoke. In cases of trachoma, eye irritation from biomass smoke may cause persons to rub their eyes which, under unsanitary conditions, can spread the infection.

Furthermore, the effects of biomass smoke on human eyes have been widely documented in previous studies (Mishra, Retherford & Smith, 1997; Schwela, 1997; Warwick & Doig, 2008). Smoke from biomass fuel, which contains some of the same pollutants found in tobacco and in ambient air, have been linked with ocular diseases such as acute and chronic conjunctivitis, trachoma, dry eye syndrome, and cataract (Mishra, Retherford & Smith, 2002). The paper is a study of ocular conditions among women involved in palm kernel oil processing in the Central Region of Ghana. It explores some livelihood issues ignored in the development of projects and programs among people who are already vulnerable. The study has implications for occupational health and safety in some of the economic activities in the informal sector in Ghana.

Conceptual Issues

Occupational health and safety has been defined as the promotion and maintenance of the highest degree of physical, mental and social well-being of workers in all occupations (International Commission on Occupational Health, 2002). Couched out of the general definition of health, the definition covers aspects which are specific to the health of workers such as the maintenance of equipment and tools, the general working environment and protection from factors which can adversely affect their health. The intention is to ensure that structures are put in place to protect the health and lives of workers. While

these objectives have been largely achieved at some national and international levels, the health and safety associated with some activities such as those in the informal sector are yet to be seriously considered.

In Ghana, there is no national policy specifically on occupational health services. A draft policy jointly developed by the Ministries of Labour, Health, and Mines and Energy is yet to be promulgated. There are, however, two main statutes which govern aspects of occupational health and safety, namely, the Factories, Offices and Shops Act (Act 328 of 1970) and the Mining Regulations 1970 (LI 665) which are in use in the labour and mining sectors respectively (Clarke, 2005). Other statutes which have bearing on occupational health services are the Workmen's Compensation Law 1987, Workmen's Compensation (Calculation of Compensation) Instrument (LI 1594 of 1994), Small-scale Gold Mining Law (218 of 1989), The Mining and Minerals Act (Act 703 of 2006), Environmental Protection Agency Act (Act 490 of 1994) and the Ghana Health Service and Teaching Hospitals Act (Act 526 of 1999).

One main shortcoming of the legal provisions on occupational health services is its limited coverage: The Factories' Act and Mining Regulations Act which govern issues of occupational safety, are limited to factories, offices, shops, ports and construction and the mining sectors respectively and do not cover the informal sector (Adei and Kuufaa, 2007; Clarke, 2005; Ghartey and Dorkenoo, 2002). To fill the void and for local development, District/ Municipal/ Metropolitan Assemblies are expected to oversee safety issues in their areas of jurisdiction, and where possible, enact by-laws to regulate activities as per the Local Government Act (Act 462 of 1993). In a number of cases this has not been done. Therefore, activities in the informal sector, including the palm kernel processing industry, are not covered by any specific legislation nationwide and in a number of districts. The outcome of the existing situation is the lack of any framework to regulate and ensure occupational health and safety. This paper examines the working environment of women in the palm kernel oil processing industry and its implications for their ocular health.

Data and Methods

The main data for the study were obtained from a survey, involving a questionnaire, in-depth interview, and examination of the eyes of selected women engaged in palm kernel oil processing in the Cape Coast Metropolis and the adjacent Komenda-Edina-Eguafo-Abirem (KEEA) District of the Central Region (Awusabo-Asare and Tanle, 2007). Through an earlier study, eight main palm kernel oil processing sites were identified within the Metropolis and District. These were at Adisadel Village, Siwdo, Kakumdo, Abura, Ankafro,

Atabadze, Benyadze and Dabir. The study was conducted at these main processing sites (Figure 1).

Map of KEEA and Cape Coast Districts Showing the Study Sites

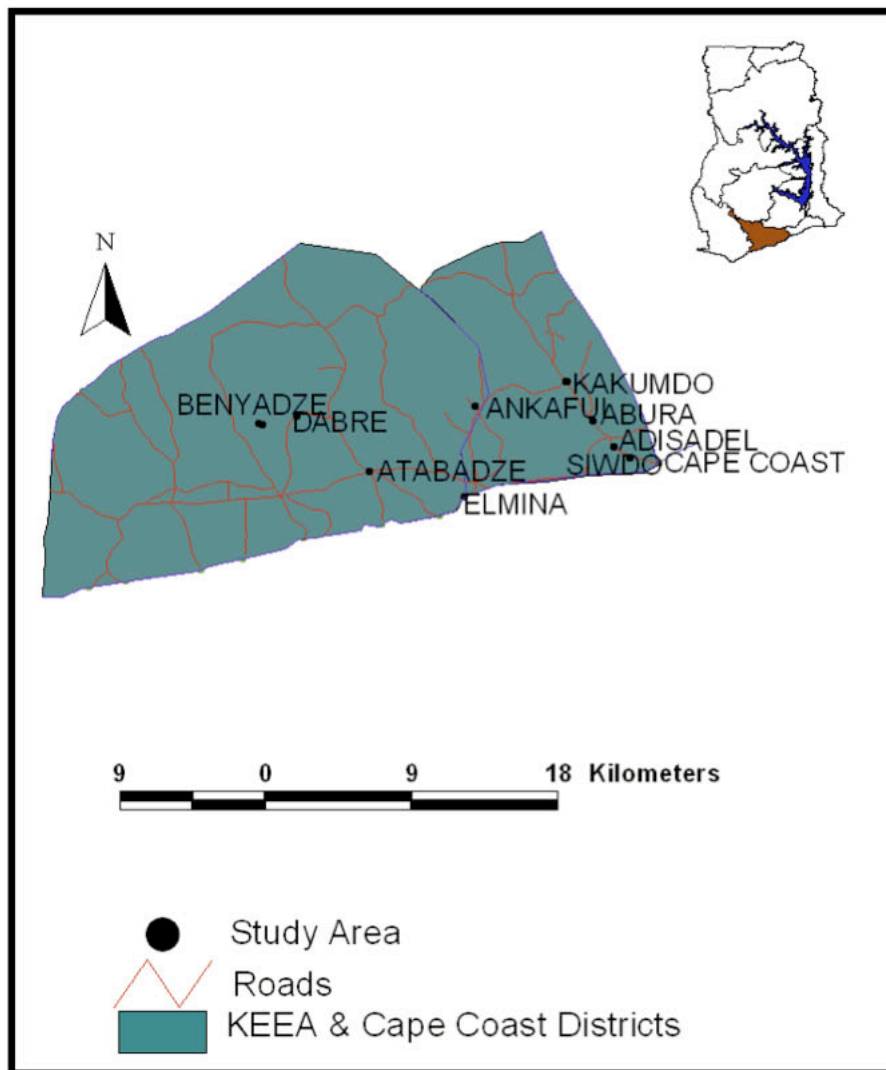


Figure 1. Map of KEEA and Cape Coast Districts showing study sites

At these sites, 300 women consisting of leaders, ordinary members and people who provided ancillary services such as the cracking and milling of the kernels were identified and listed. At each site, the women select their leaders, and among the criteria used are age, number of years in the business, and negotiation skills. The leaders usually represent the members at any meeting, manage the affairs of the site and promote the welfare of its members. The rest constitute

the ordinary members at each site. Of the 300 women listed, 185 were interviewed based on availability, number of years in the industry and willingness to be interviewed. About 20 of them were excluded because they had been in the business for less than 6 months or were assisting a relation. The 185 respondents consisted of 173 ordinary members and 12 leaders and constituted 68% of the potential respondents (Table 1). Both the ordinary members and leaders were interviewed using questionnaire and in-depth guide. The instruments were reviewed by the University of Cape Coast Ethical Review Board before they were administered. Among other things, the results from this first study (see Awusabo-Asare and Tanle, 2008) indicated that the women faced health problems, including ocular health. As a follow-up, the Department of Population and Health, in collaboration with the Department of Optometry, organised an eye screening test for the participants.

Table 1: Distribution of respondents by site and sample size

Site	Total number of member		Number interviewed		Total number of leaders		Number interviewed		Total number interviewed	
	F	%	F	%	F	%	F	%	F	%
Adisadel	52	15.6	35	21.0	4	17.6	2	16.6	37	20.0
Siwdo	26	7.8	13	7.8	2	8.8	1	8.3	14	7.6
Kakumdo	33	9.9	15	9.0	2	8.8	1	8.3	16	8.6
Abura	81	24.3	50	30.0	6	26.4	4	8.3	54	29.2
Ankaful,	16	4.8	9	5.4	2	8.8	1	8.3	10	5.4
Ataabadze	35	10.5	20	12.0	2	8.8	1	8.3	21	11.3
Benyadze	38	11.4	21	12.6	3	13.2	1	8.3	22	11.9
Dabir	19	5.7	10	6.0	2	8.8	1	8.3	11	5.9
N	300	100.0	173	100.0	23	100.0	12	100.0	185	100.0

For the eye test, women were bussed to the Abura processing site where the leaders had assured the team of their support. The leaders of the rest of the sites assisted in mobilising the women for the test. Within a period of two days 100 women were examined. Visual acuity (VA) was assessed using the Snellen illiterate E chart at 6 metres. Blindness was defined as VA < 3/60 in the better eye while visual impairment was defined as VA < 6/18 to 6/60 in the better eye. VA of 6/18 or better in the worse eye was regarded as normal. Subjects unable to see 6/18 had their VA re-assessed with pinhole. For those unable to see 6/18 with pinhole, clinical judgement was used to determine the main cause of visual impairment or blindness. If two or more pathologies were adjudged to contribute equally, visual impairment was attributed to the most treatable cause.

Ocular health examination was performed using a pen torch and direct ophthalmoscope. Static retinoscopy without cycloplegia but with a fogging technique shown to have comparable result to cycloplegia was performed on all patients as a starting point for full subjective refraction. Best corrected acuity after subjective refraction was measured in each eye. Refractive error was defined as measured spherical error greater than 0.8D in the better eye. Cataract was defined as a lens opacity consistent with 6/12 or worse vision. Glaucoma was defined as the presence of a pale, cupped disc with a cup to disc ratio of 0.6 or more. One hundred persons were assessed using the World Health Organisation disability scale (WHO, 1973). The WHO disability scale is the international standard and most reliable diagnostic classification for visual impairment in researches involving some population sub-groups. The disability scale actually grades “impairments” rather than “disabilities” although the word disability is the standard operational terminology for “impairment” in all general epidemiological and clinical use (Refer to World Health Organisation's International classification of functioning, disability and health (ICF), WHO Geneva 2001). According to the scale (WHO, 1973) eyes rather than people are assessed which implies that 200 eyes were examined in the study.

The survey and the eye examinations were carried out in June 2010 by two lecturers and three students at the Departments of Population and Health; and two doctors of optometry, who are lecturers, and three postgraduate students at the Department of Optometry, University of Cape Coast, conducted the ocular test about two months after the fieldwork. The Statistical Product for Service Solution (SPSS) version 12 was used to analyse the quantitative data.

Results

Socio-demographic characteristics of respondents

Of the 100 women who presented themselves for assessment, more than half (53.0%) were aged 45 years and above; 73% had never had formal education, and one per cent claimed to have had secondary school education. Four out of ten respondents reported that they had worked for less than ten years while a third had been in the business for 20 years and above (Table 2). These were also women with no formal education or training, and two out of three women had worked in the palm kernel business for ten years or more.

Table 2: Socio–demographic characteristics of respondents.

Age	Frequency	Percentage
<25	14	14.0
25-34	14	14.0
35-44	19	19.0
45-54	25	25.0
55+	28	28.0
Highest level of education		
None	73	73.0
Primary or higher	27	27.0
Duration in business		
< 10	40	40.0
10-19	22	22.0
20-29	22	22.0
30-39	10	10.0
40+	6	6.0
N	100	100.0

Palm kernel processing activities

From the study the following activities were identified in the processing of the palm kernel oil:

- Winnowing which is carried out to remove particles and dust after the nuts have been cracked;
- Removing all unwanted materials or the few un-cracked nuts. This activity involves sitting at one spot for several hours for two or three days;
- Washing the nuts with clay to separate the nuts from the shells;
- Washing the clay off the nuts and drying before frying;
- Frying the nuts for four to five hours (at times in the hot sun). Palm kernel shells and firewood are used as fuel;
- Fetching water to mix with the ground nuts to produce a fairly thick nut paste; this is done over distances because some of the sites do not have water

readily available. This can involve a number of trips depending on the quantity to be processed;

- Boiling the paste for about two to three hours: This involves boiling and stirring of the paste over hot fire to induce the oil (See figure 2); and
- Extracting the oil which forms on top of the paste while boiling until only the thick paste is left in the pot. This process may last for 12 hours (could be left overnight to cool).

Activities 1, 5, 7 and 8 have in-built ocular health hazards: Dust and particles from the winnowing, frying of the nuts, boiling of the paste and the scooping of the oil nuts. The last three activities involve spending several hours over smoky environment and exposure to heat as the sources of fuel are palm kernel shells and firewood. There are also the related hazards of burns, heat and cuts. In spite of these hazards, none of the women used any protection in any of the stages – such as wearing of goggles during winnowing and the frying of the nuts and the boiling of the paste (Figure 2).



Figure 2: Photograph showing some women stirring the paste on fire in the sun

In the survey, the 100 women were asked to mention the most common health problems which, in their opinion, could be attributed to their work. According to them, the most common health problems that they experienced from their work were general body pains (67.0%) and malaria (20.0%) (Table 3). General bodily pains and symptoms of malaria accounted for nearly 90% of the reported cases and did not mention ocular health as an immediate problem.

Table 3 Most common health problems

Problem	Frequency	Percentage
Malaria	35	20.2
Cholera	17	9.8
Diarrhoea	5	2.9
Body pains	116	67.1
N	173	100.0

Similarly, in the in-depth interviews, health problems, other than ocular, came up as the major ones. For instance, in an answer to the major health problem, one of the respondents, Grace (pseudonym), identified bodily pains as the major problems associated with the business.

R: “Occasionally, I experience some pains at my chest, ribs or waist mostly in the nights because of the various activities I go through in the business (Grace, about 41 years).”

Like a number of her colleagues, she did not consider the implications of the activity for her ocular health. However, another respondent, Afetey (about 45 years) identified ocular health as one of the challenges associated with the business. According to her:

I: “Does this business (processing of palm kernel oil) have any effect on your health?”

R: “Yes! Once when I was winnowing, particles from the cracked kernels fell into my causing it to itch. Also, when stirring the oil paste some oil splashed on my arm and this has left a scar on my arm (she shows it). [Afetey, about, 45 years].”

Some of the women had experienced ocular health problems and, therefore, were aware of some of the possible implications of some of the processes for their ocular health. As in the case of Grace, a number of them have not considered the implications of their activities for ocular health as this was not spontaneously mentioned. The study further explored their health seeking-behaviour and involvement in the health insurance scheme. For instance, Afetey did not seek professional medical care when particles got into her eyes. The response from the in-depth was typical of the responses from the women on ocular health-seeking behaviour. Furthermore, none of them had ever sought ocular care, including those who had ever had a problem. It was based on these narrations and observations that follow-up eye tests were conducted for some of the women.

Results from eye test

Ocular pathology

Of the 200 eyes examined, 56% had, at least one ocular pathology. The commonest pathology was chronic (allergic) conjunctivitis, which was seen in at least one in five eyes, followed by pterygium (11.1 %), and cataract (8.0%). The prevalence of glaucoma (C/D ratio > 0.6) was 2.5%. The spectrum and frequency of ocular pathology among the subjects are shown in Table 4 and Figure 3. From the results, only 22% can be directly related to hazards on the job and impairment.

Visual status

Of the 200 eyes examined, 83% had grade zero disability (no evidence of visual loss) and about 16% had grade 1 disability (evidence of visual loss, but VA 6/60 or better). The prevalence of blindness (VA <3/60 with available correction) was about two per cent. An additional six per cent of the women were visually impaired (6/60=VA<6/18). At least one eye in six had a refractive error that reduced VA to <6/18. Astigmatism 33 (16.5%) was the most common refractive error (Table 4) and (Figure 3). The VA and refractive error of one subject could not be determined as a result of non compliance. The other category consisted of diabetic retinopathy, retinal detachment, juxtapupillary choroiditis and toxoplasmosis. Refractive errors (32.5%) and cataracts (8.0%) were the commonest cause of visual impairments. Toxoplasmosis (0.5%), severe corneal lesions (0.5%) and retinal detachment (0.5%) were the sole causes of blindness. Although refractive error was the leading cause of visual impairment, only one person reported having worn spectacle correction.

Table 4: Spectrum and frequency of ocular conditions among subjects

Diagnosis	Frequency	Percentage
Astigmatism	33	16.5
Hyperopia	18	9.0
Myopia	14	7.0
Presbyopia	24	12.0
Allergic conjunctivitis	43	21.5
Bacterial conjunctivitis	4	2.0
Corneal ulcers	1	0.5
Pinguecula	6	3.0
Pterygium	22	11.0
Cataract	16	8.0
Glaucoma	5	2.5
Others	14	7.0
N	200	100.0

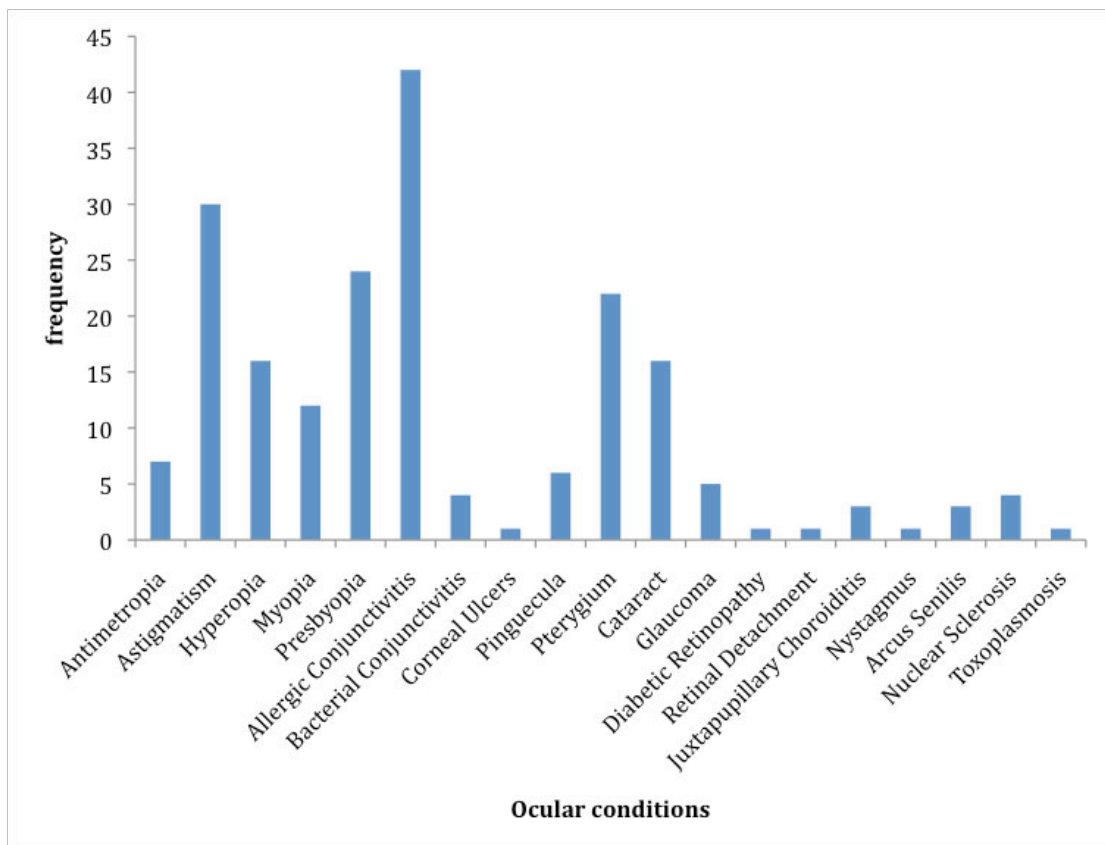


Figure 3: Distribution of Ocular Conditions

In 2003, the Government of Ghana introduced a health insurance scheme which covers basic medical cases (e.g. routine treatment such as diarrhoea, upper respiratory disease, malaria, cholera, etc.) and prevention of blindness which covers free cataract surgery and subsidised services for management of ocular conditions for the insured. In the absence of a policy to regulate safety, people are expected to be treated in the case of accidents. One of the challenges, though, is the number of people who are aware of and registered with the scheme.

The 100 women who were examined were asked about their awareness of the National Health Insurance Scheme (NHIS) and whether they had registered. About two thirds (58%) of the respondents were aware of the NHIS. Of the 58% who had heard about it, 25% (15) said they had registered, implying that 85% had not registered (43 among those who had heard and 42 of those who had not heard). With the NHIS in operation for about seven years, some of the women claimed that they had not heard of it, and these were women who were involved in an economic activity with health hazards.

Discussion and conclusions

The processing of palm kernel oil provides income and viable economic activities to poor women in the Central Region, but these benefits are not without its costs, one of them being the health hazards involved in the activity. The conditions under which palm kernel oil is extracted entails high levels of exposure to smoke, heat and dust, with implications for ocular health (See figure 2).

Over half of all eyes of the women examined in this study had one or more identifiable ocular lesions out of which nearly a quarter (chronic conjunctivitis, pterygium, pinguecula and cataract) could be attributed to hazards associated with the processing processes. Symptoms of itching and chronic (allergic) conjunctivitis can be linked to long term exposure to biomass smoke. This is not unusual, as in general, there is interplay between immunity to allergies and length of exposure. But a number of the women did not make direct links when asked about the implications of the activities for their health.

Cataract is the commonest cause of treatable blindness in most population based studies in Africa, and has been found to correlate with long term exposure to biomass smoke (Pokhrel, Smith, Asheena, Amar, & Bates, 2005). From the study, the prevalence of pterygium, which is often a reactive or proliferative response to environmental influences, was high. The environmental irritants are

commonly present at the processing sites and these include dust, wind, particulate and chemical air pollution as well as solar radiation (Apple & Rabb, 1991). The high prevalence of Pterygium among the women could thus be associated with the working environment.

Glaucoma was identified to be responsible for only about three per cent of the pathologies diagnosed in this study. This is inconsistent with other reports from the developing world where glaucoma is the second leading cause of visual impairment (Gregory and Pitts, 2001, Odjimogho and Odjimogho, 2004). This may perhaps be due to diagnosing glaucoma in this study: fundoscopic findings of CD ratio of six. The activities involved in the processing of palm kernel oil predispose the processors to potential risk factors for developing eye diseases. Provision of eye and vision care services at regular intervals would significantly reduce the magnitude and severity of ocular problems associated with this industry. Further studies should ideally include more information on the prevalence of dry eye syndrome.

Conclusions

The hidden cost of promoting small-scale activities within the context of poverty reduction is hardly factored into the development planning process. Pro-poor strategies hardly include mitigating factors for unintended negative side effects of activities. Some of the women in the oil palm kernel processing business were found to be suffering from occupational related ocular health which constituted a hidden cost in the business. There are other hidden health costs which can be investigated to provide basis for incorporating health and other concerns into pro-poor activities. Those working in the informal sector where no regulations exist, especially the women involved in small-scale processing such as soap-making, shea butter processing, and stone cracking (Lund, Dei, Boakye and Opoku-Agyeman, 2008), face serious health hazards. At the institutional level, occupational health and safety laws and procedures exist but are enforced mostly in the formal sector. A National Health Insurance Scheme was introduced in the country in 2003 to provide basic healthcare for people. However, over 80% of the women engaged in the palm kernel oil processing had not registered as at the time of the survey. The low patronage of the national health insurance scheme reflects the general conditions in the country among the urban poor (GNA, 2011). The provision of health care generally, and eye and vision care services in particular, at regular intervals could significantly reduce the magnitude and severity of health problems associated with such industries.

The Cape Coast Metropolitan and Komenda-Edina-Eguafo and Abirem Assemblies which are responsible for the areas where the study was undertaken need to enact by-laws to protect the health and lives of the women who are involved in the palm kernel oil processing industry as per the Local Government Act (Act 462 of 1993). Promoting the health and safety of citizens should be part of pro-poor programmes in the development agenda of national and local governments.

References

- Adarkwa, K.K. and Edmundsen, A.R., 1993. Urban waste management in Ghana: A study of Eleven Urban Centres, Kumasi: Kwame Nkrumah University of Science and Technology
- Adei, D. and Kunfaa, E., 2007. Occupational health and safety policy in the operations of the wood processing industry in Kumasi. *Journal of Science and Technology* 27 (2)
- Apple, D. J. and Rabb, M. F., 1991. *Ocular pathology: Clinical and Self Assessment*, London: Mosby-Year Book Inc.
- Amu, N.J. (2005). The role of women in Ghana's economy. from <http://www.library.fes.de/pdf-files/bueros/ghana/02990.pdf>
- Awusabo-Asare K., and Tanle, A., 2008. Eking A living: Women entrepreneurship and poverty reduction strategies: The case of palm kernel oil Processing in Central Region of Ghana. *Norsk Geografisk Tiosskrift*, 62, pp. 149 – 160.
- Bartelings, H., 2003. *Municipal Solid Waste Management Problems: An applied general equilibrium analysis*, Unpublished PhD Thesis, Wageningin University.
- Bennagen, M.E.C., 2001. Comfronting the garbage problem with economic solutions. *Development Research News*, 19(4), pp. 5-11
- Clarke, E. 2005. Do occupational health services really exist in Ghana?. In: S. Lehtinen, J. Rantanen, K. Elgstrand, J. Liesivuori, and Peurala, M. (eds), *Challenges of Occupational Health Services in the Regions. The National and International Responses*, Proceedings of a WHO/ICOH/ILO Workshop, 24 January, Finnish Institute of Occupational Health, Helsinki, pp. 16-25. Available at: http://www.rics.org/site/download_feed.aspx?fileID=8099&fileExtension (Accessed 7 December, 2011)
- Charmes, J., 1998. *Women in the Informal Sector in Africa: New Methods and New Data*, French Scientific Research Institute for Development and Co-operation. Available at: www.wiego.org/papers/1informal.html - Cached - Similar (Accessed 10 December, 2011).

Fajemilehin, B.R. and Jinadu, M.K., 1995. Occupational health hazards associated with traditional methods of cassava processing in Nigeria. Available at: <http://www.ttl.fi/Internet/English/Information/Electronic+journals/African+Newsletter/1995-02/06.htm> (Accessed 27 July, 2011).

Ghana News Agency, 2011. Health workers worried about low patronage of NHIS in Gomoa, Gomoa: www.ghananewsagency.org (Accessed 16 December, 2011)

Ghana Statistical Service, 1996. Measuring Informal Sector Activity in Ghana, Proceedings of a Ghana Statistical Service, Accra: Overseas Development Administration Workshop, January 1995, 144p.

Ghana Statistical Service, 2002. 2000 Population and Housing Census. Available at: <http://www.ghanaweb.org>. (Accessed 30 November 2011).

Ghartey, N. K. and Dorkenoo, D. K., 2002. Unionising informal workers in Ghana, Unprotected Labour: What role for unions in the informal economy. Labour Education Paper No. 127. Geneva: ILO

Gregory, L.S. and Pitts, D.G., 2001. Ocular protection. Houston-America Optometric Association. Available at: URL:www.aoa.org (Accessed 29 September 2011).

Handley, G. and Haggins, K. and Sharma, B., 2009. Poverty and poverty reduction in Sub-Saharan Africa: Overview of key issues. Overseas Development Institute, Working Paper 299, Available at:<http://www.odi.org.uk/resources/download/600.pdf>, (Accessed 14 October, 2011).

Loewenson, R., 1995. Occupational health in small-scale industries in Africa. Available at: <http://www.ttl.fi/Internet/English/Information/Electronic+journals/African+Newsletter/1995-02/05.htm> (Accessed 24 February, 2011).

Lund, R., Dei, L. A., Boakye, K. A. and Opoku-Agyeman, E. 2008. It is all about livelihood: A study of women working in stone chip production in Cape Coast Municipality, Ghana. *Norwegian Journal of Geography* (62): 139-148

Mishra, V. K., Retherford, R. D., and Smith, K. R., 1997. Effects of Cooking smoke and prevalence of blindness in India. *Population Series*, 91, pp. 1-24.

Mishra, V. K., Retherford, R. D., and Smith, K. R., 1999, Biomass Cooking Fuels and Prevalence of Blindness in India. *J. Environ. Med*, 1, pp. 189-199

Mishra, V. K., Retherford, R. D., and Smith, K. R., 2002. Indoor air pollution: the quiet killer. *Asia-Pacific issues*, 63, pp. 1-8

National Academic of Sciences, 2009. Emerging Technologies to Benefit Farmers in Sub-Saharan Africa and South Asia. Washington, D.C.: The National Academies Press, Available at: http://www.nap.edu/openbook.php?recor_id=12455&page... (Accessed 29 November, 2011).

- Newell W.F., 1992. *Cataracts - Ophthalmology Principles and Concepts* 7th ed. St. Louis: Mosby Year Book
- Odjimogho, E.S. and Odjimogho, E. S., 2004. *Understanding common eye problems—a treatment guide*. Ibadan: Ibadan University Press, PLC
- Pokhrel, A. K. et al. 2005. Case-control study of indoor cooking smoke exposure and cataract in Nepal and India. *Int J. Epidemiology*, 34, pp. 706-707.
- Sabitu, K., Iliyasu, Z. and Dauda, M.M., 2009. Awareness of occupational hazards and utilisation of safety measures among welders in Kaduna Metropolis. *Annals of African Medicine*, 8(1), pp. 46-51
- Schwela, D., 1997. Cooking Smoke: a silent killer. *People Planet*, 6(3), pp. 24-25
- Tschakert, P. and Singha, K., 2007. Contaminated Identities: Mercury and Marginalisation in Ghana's artisanal mining sector. *Geoforum*, 38, pp. 1304-1321.
- Warwick, H., Doig, A., 2004. *Smoke-the killer in the kitchen. Indoor air pollution in developing countries*. London: ITDG Publishers, pp. 1-39
- Williamson, S., Ball, A. and Pretty, J., 2008. Trends in pesticide use and drivers for safer pest management in four African countries. *Crop Protection*, 27, pp. 1327-1334.
- World Health Organisation, 1992. *Epidemiological, Social, and Technical Aspects of Indoor Air Pollution from Biomass Fuel. Report of a WHO Consultation June 1991*, Geneva: WHO
- World Health Organisation , 1973. *WHO Study Group on the Prevention of Blindness, Technical Report Series No 518*, Geneva: WHO