

## ARECA NUT SYMPOSIUM

# Socio-economic aspects of areca nut use

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### Abstract

*The socio-economic aspects of areca nut consumption have been overlooked. A narrative review was conducted to establish some of these features of areca nut consumption. Medline, Pubmed and the WorldWideWeb were searched using the terms: areca nut, betel nut, areca catechu and pan masala. Further analysis was conducted of datasets describing aspects of United Kingdom areca nut sales and consumption. South Asian economies at different stages of development have varying areca nut cultivation practices, employment opportunities and marketing strategies. Attempts at regulation of areca nut import and sales are described. Retail practice among the South Asian communities of the United Kingdom was found to reflect the diverse consumer practices current in their countries of origin. A study of areca nut consumption patterns and motivations among Bangladeshi women resident in East London identified differences between those chewing areca nut in paan with and without tobacco. Further research into the socio-economic aspects of areca nut consumption is needed which should be multidisciplinary in focus, of sound scientific quality and incorporating the opinions of consumers.*

### Introduction

To discuss socio-economic aspects of areca nut use provides belated recognition of a neglected aspect of a multidimensional behaviour. The main thrust of research into areca nut use has been epidemiological, seeking to identify trends in behaviour and the resulting disease outcomes. Less attention has been given to the social aspects of areca nut consumption. This focus would widen the debate from a disease to a social model of health, recognizing that the determinants of health are broader than individual behaviours. The preventive focus has been upon developing messages for individual consumers, disregarding opportunities to introduce other policies and initiatives that focus upon other determinants of

this behaviour. Changing social and economic policies may lead to changing cultivation and marketing practice which will, in turn, affect individual consumption. The search for a preventive message has given inadequate attention to variations in areca nut use. In the United Kingdom the emphasis has been upon understanding a South Asian model of consumption, which is linked to positive sociocultural messages perceived as promoting increased consumption.<sup>1</sup> In other populations consumption could be different, because areca is associated with abundant availability and tradition.<sup>2,3</sup> Current estimates that 10% of the world's population are regular consumers, comprising perhaps 600 million people, suggest the desirability of widening per-

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spectives. A review was therefore conducted to establish and describe some of the relevant socio-economic features of areca nut consumption.

## Methods

This review has two strands. First, a search of existing literature sources was undertaken. Medline and Pubmed were searched using the search terms: areca nut, betel nut, areca catechu and pan masala. In addition the World Wide Web was accessed for a supplementary search focusing upon the production, processing and marketing of areca nut. Secondly, further analysis of data sets which describe aspects of areca nut sales and consumption within the United Kingdom was conducted.<sup>3-5</sup> Reflecting the limited nature of the resources available to describe the socio-economic aspects of areca nut use, the data are presented as a series of case studies.

## Results

### *Changing areca nut cultivation*

*Areca catechu*, of which areca nut is a fruit, is one of the palm species. Palms are one of the oldest flowering plants. Initially native to Malaysia, *A. catechu* is now cultivated widely throughout India, Sri Lanka, Thailand and the Phillipines.<sup>6</sup> Palms offer a multiplicity of uses in a rural agrarian economy. They provide fodder for cattle, edible fruits, building materials, fuel and fibres. Gandhi argued that one species of palm had such a multiplicity of use that its cultivation and harvest would banish poverty from the land, while 1000 separate uses have been identified for the coconut palm.<sup>7</sup> The date palm is considered the staff of life by Moslems, recognizing the importance of the date in the breaking of the fast during Ramadan. The cultivation of *A. catechu* is traditionally described as an intercrop in India, alongside the piper betle, as a forest garden in Sumatra or as part of a private allotment.<sup>8,9</sup> The Nepalese government has introduced initiatives to encourage the private planting of species such as *A. catechu*.<sup>10</sup> This individual method of cultivation was mirrored by the complementary consumption of fresh perishable products, based around individual preferences and tastes.

The liberalization of economic policy, trends to urbanization and increased prosperity have introduced tensions into this traditional scenario. *A. catechu* may now be grown and prepared to meet

the needs of a mass market. The development of pan masala, a pre-packaged mix of areca nut, lime and spices, in India has been one response to this need. More pan masala is sold in urban than rural areas.<sup>11</sup> While still individually cultivated, the *A. catechu* tree is found increasingly in privately owned plantations to which a community will have limited access. Communities may well feel exploited and aggrieved, following the loss of a traditional right.<sup>9</sup> The development of areca nut as a market crop has resulted in it replacing other crops such as rice, cultivated previously for subsistence, and the introduction of fertilizer and pesticide applications to improve yields. As a cash crop rather than a rural garden tree, it has to be used to achieve maximum profit. Additional uses have been identified for the nut such as toothpaste, while the husk can be used to make paper or as a source of fuel for electrical power generation.<sup>12,13</sup>

The national and regional companies producing pan masala do so as part of a diverse range of products. The Kothari Group produce Pan Parag, a premium pan masala of fresh areca nuts, cardamom and lime, as part of a product range which includes tobacco products, coconut oil, washing powder, greeting cards, mineral water and writing pens.<sup>14</sup> Suppliers of the raw product for export can be located on the Web, most usually from Indonesia, where it is possible to purchase different qualities of nut in 50- or 85-kg sacks.<sup>15</sup>

The price for harvested areca nut in India appears volatile. In 1997 the government of India was asked to stop imports of areca and prevent smuggling, while by 1999 there were reports of a single premium quality areca nut costing more than a coconut (at 4-5 rupees). In general, the wholesale price appears to have fallen by about 30%, reflecting concerns about the impact of government bans on sales of the processed packaged product either as pan masala or, with tobacco added, as gutkha.<sup>16-18</sup>

### *Changing employment opportunities*

The processing of areca nut in India has traditionally required the employment of a labour force, especially in preparing the nut for consumption. The nut has then been supplied to individual pan wallahs, from whom individual purchases could be made. Changing cultivation practices have resulted in the recruitment of a

permanent labour force to tend the trees who, in return, receive regular cash wages.<sup>8</sup> The aggressive marketing of pan masala has jeopardized the pan wallahs' livelihoods. There are reports of pan wallahs striking in one Indian town because of reduced profit margins due to the price they pay for areca nut doubling in 12 months.<sup>19</sup> The production of pan masala requires the integration of supplies of individual ingredients in addition to areca nut alone, all of which may be produced in different parts of India. Other industries associated with pan masala production are the spice and silver foil industries. This use of indigenous suppliers enables the Indian pan masala trade association to make the claim that their product is 'swadeshi', signifying a product using domestically supplied ingredients.<sup>20</sup>

One focus of this marketing activity has been on the urban Indian consumer. However, it is estimated that 70% of Indians live in rural areas. Growing rural affluence has led to the creation of a developing market for packaged goods which manufacturers have not been able to meet. This has been ascribed to factors such as inefficiencies in distribution through a fragmented transportation infrastructure. It has been noted that innovative methods of packaging have been introduced to bring down overall costs and create markets. As with products such as hair shampoo and toothpaste, the packaging of pan masala has been changed from containers to 10-g sachets. This change is considered responsible for an increase in sales in India from five million dollars in 1985 to 66 million dollars in 1991.<sup>21</sup>

#### *The regulation of areca nut marketing*

The regulation of areca nut and products such as pan masala is extremely difficult. First, the traditional method of consumption has involved the assembly of a quid with ingredients reflecting individual preferences. Secondly, there is a large informal sector, highly decentralized and unlicensed, which operates outside of official control. While the Indian government seeks to impose excise duty upon the sale of pan masala, it is also recognized that there is wholesale evasion of payment of the duty. Recently, pan masala with no tobacco and no more than 10% of areca nut by weight has had the rate of excise duty reduced from 40% to 16%.<sup>22</sup>

Within North America the US Food and Drugs Administration maintains an import 'alert' for

areca. Imports are automatically detained if detected on the grounds of it being 'adulterated, containing a poisonous or deleterious substance or unsafe food additives'. There are also reports of attempts to import areca nut by misbranding the product as 'fragrant wood slice'. This 'alert' is supported by the US Department of Agriculture. Commentators note the need for clarification of the status of this alert since US Customs advise that dried betel nuts should pay an import duty of 11 cents per kilo.<sup>23</sup>

Areca nut for personal consumption, 'pure nut, chopped and ready to chew', is readily available to purchase on the World Wide Web from American suppliers, at \$10 for 60 g and \$25 for 240 g, along with advice on consumption.<sup>24</sup> Possession of areca nut in the Californian public school system is grounds for suspension. The Food and Drugs Administration has also formally expressed a view to the US House of Representatives that individual possession for personal consumption should not be allowed.<sup>25</sup>

Within the United Kingdom, analysis of pre-packaged pan masala products has identified a group of problems.<sup>26</sup> First, labelling on the packaging was sometimes non-existent. Instructions as to use were also omitted. Secondly, the labelling might be unsatisfactory in omitting items which, on analysis, were found to be present. Thirdly, products contained non-permitted food additives, sometimes in excessive amounts. Samples of the raw ingredients such as pan leaves were also examined and found to be contaminated with salmonella. The labelling inadequacies would be expected to lead to prosecution of the importer of the product.

#### *The marketing of areca nut in the United Kingdom*

Two contrasting studies of retail practice in the United Kingdom have been carried out in London and Leicester.<sup>3,4</sup> The first investigation was carried out in 1996 to map the availability of paan ingredients in the London Boroughs of Tower Hamlets and Newham. First, the addresses of retail outlets selling paan ingredients were mapped. Secondly, a structured interview schedule was administered to the owners of each shop. The overall response rate for the interview was 76%. The schedule contained questions about the type of shop and its opening hours, which paan ingredients were sold, in what quantity and for what price. One hundred and twenty-eight shops

were identified as selling paan ingredients, 95 in Tower Hamlets and 33 in Newham. Reflecting both this geographic distribution and the dispersal of South Asian communities in London, more shops were owned by members of the Bangladeshi community in Tower Hamlets, while in Newham paan shops were owned predominantly by members of the Indian and Pakistani communities. Shopkeepers supplied products which reflected the expectations of their communities. The shops serving the Bangladeshi community provided a predominantly traditional product, i.e. supplies of loose areca nut, the betle leaf, lime and tobacco which were purchased for individual assembly and consumption. The shops supplying the diverse South Asian populations of Newham had a greater availability of pre-packaged areca nut.

The trade in all paan products (betle leaf, lime, areca nut and tobacco) in Tower Hamlets and Newham was estimated as approximately £1 million per year. Areca sales averaged 64 lbs weight a week for each retailer, with a range of 500–600 pounds weight. The retail price was approximately £1 per pound weight and the estimated weekly sales were £8538. These sales of areca nut were estimated to comprise approximately half of the total weekly sales of all paan products.

The hypothesis that retailers supply the products that they perceive their customers as needing has been supported by a second study carried out in Leicester. Adopting a methodology which mirrored the East London study, 60 retail outlets which served the predominantly Gujarati community and which had the potential to sell paan products were identified. Just over half of these retailers sold paan ingredients. However, in contrast to the East London retailers, the sale of pre-packaged pan masala products was much more common than the sale of individual ingredients. Most shops sold only pre-packaged products, although it was also reported that the Bangladeshi community primarily bought the fresh products. The authors' report suggests that the practice of consuming pre-packaged pan masala would start following visits to the Indian subcontinent. This argument would have less validity in Bangladesh. As the population is largely rural and poor and the transport infrastructure is undeveloped, visitors returning there would find that plain paan products would continue to be preferred.<sup>27</sup>

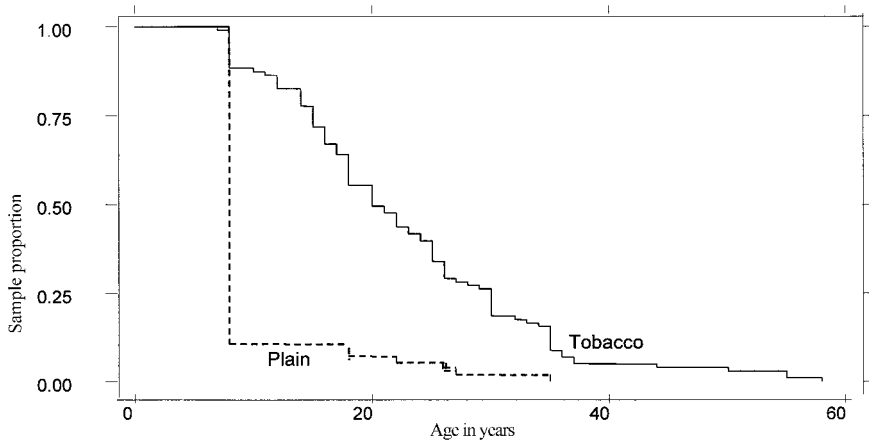
#### *The prevalence of areca nut consumption*

Within the United Kingdom there has been a series of studies of paan chewing, usually with or without the addition of tobacco.<sup>28–33</sup> Estimates of the prevalence of chewing paan vary from 45 to 95%. There are several possible reasons for this variation. First, the samples may not have been drawn from the same South Asian community. Secondly, there may have been variation in the wording of the questions. Studies may ask about experience of use ('have you ever had'), while others have inquired about current use. Questions have not always adequately defined the terms used, failing to distinguish between paan with and without tobacco. Thirdly, there has been variation in sampling practice. These studies are reviewed by Warnakulasuriya in this issue.

Commonly used factors to explain any variation might be age, gender and social class. As suggested above, the data to identify variation around these factors is not always available. Within these constraints:

- Several UK studies suggest that the age of starting to chew areca, usually in paan, is about 10 years.<sup>34–36</sup>
- At age of onset there appears to be no variation in gender, although older people eat more areca.<sup>11</sup>
- Consumption decreases with educational attainment.<sup>11</sup>
- Rural rather than urban communities consume more paan. In this context the rural–urban continuum may be interpreted as a proxy measure of social class, with urban communities being of higher social status.<sup>11</sup>
- The Bangladeshi community is the most socially disadvantaged of the three South Asian communities. Estimates of paan chewing in this community are high, reflecting its adoption by women as a method of consuming tobacco.<sup>34</sup>

The validated prevalence of paan chewing with tobacco by UK resident Bangladeshi women has been investigated.<sup>5</sup> The study design and data collection have been described elsewhere but, in brief, the investigation involved the selection at random of a group of 242 women resident on two local authority housing estates in the London Borough of Tower Hamlets. The study was conducted during 1998. The participants were interviewed using a previously piloted structured



**Figure 1.** Retrospective age of starting current paan use (with and without tobacco) in a sample of Bangladeshi women ( $n = 166$ )

interview schedule containing questions about age, aspects of tobacco use and the degree of self-reported dependence upon tobacco. Validation of responses was achieved with carbon monoxide and cotinine concentration analysis. This validation exercise enabled the identification of a group of paan chewers without tobacco.

The outcomes of this study showed that 75% ( $n = 169$ ) of the whole sample were currently chewing either paan without or paan with tobacco. While 49% ( $n = 111$ ) of the whole sample were classified as current paan with tobacco chewers, 25% ( $n = 58$ ) were currently chewing a plain paan with basic ingredients of betle leaf, areca nut and lime without tobacco. Current plain paan chewers had a significantly younger mean age (32.4 years vs. 39.0 years,  $t = 4.0194$ ,  $p = 0.000$ ). The consumption patterns of plain paan chewers and paan with tobacco chewers differed in terms of the mean number of paan chewed daily (2.23 vs. 9.00,  $t = 6.905$ ,  $p = 0.000$ ), the age of starting their current practice (9.7 vs. 21.2 years,  $t = 8.342$ ,  $p = 0.000$ ) and the length of their chewing career (22.7 years vs. 17.9 years,  $t = 2.179$ ,  $p = 0.031$ ).

Figure 1 further clarifies the age at which the current paan chewing practice had commenced. The majority of plain paan chewers had started their current practice at or around the age of 8 years, while the impetus for starting to add tobacco to paan occurred at different times in the respondents' life spans. Fifty per cent of the paan with tobacco chewers had still to start their current tobacco consumption at the age of 20

years. These differences were tested using the log-rank test for equality of survivor functions and were found to be statistically significant.

The plain paan and paan with tobacco chewers also differed in their motivations and practice (Table 1). Plain paan chewers were more likely to cite 'refreshing' as their main reason for chewing whereas those chewing paan with tobacco most commonly cited 'habit' as their reason for chewing. While the paan with tobacco chewers were more likely to have their first paan of the day within 1 hour of waking, for those chewing plain paan this was more likely to happen at least 2 hours after waking. Finally, plain paan chewers reported only a moderate intention to stop this practice, compared to the paan chewers with tobacco who were more likely to report a strong intention to stop adding tobacco to their paan. These differences were tested using the chi-square test for trend and were found to be statistically significant.

## Discussion

This paper has reviewed some of the socio-economic aspects of areca nut consumption. Data to support a comprehensive systematic review, reflecting the wide use of areca nut, is lacking. The sources used have their limitations, being dependent upon the geographic location and focus of academic research interest in areca nut and the geographic development of the World Wide Web. An emerging outcome has been the identification of a heterogeneous method of use,

**Table 1.** *Paan quid consumption, with and without tobacco. Beliefs and behaviours in a sample of Bangladeshi women (n = 169)*

Questionnaire item	Chew pan quid without tobacco (n = 58)	Chew pan quid with tobacco (n = 111)	Significance
Reason for chewing (%)			
habit	22.8	61.2	0.000
refreshing	63.2	12.6	
helps teeth and gums	7.0	22.3	
other	7.0	3.8	
First paan quid of the day (%)			
within 1 hour	1.8	39.8	0.000
within 1–2 hours	7.0	26.2	
2+ hours	91.2	34.0	
Intention to quit (%)			
none	28.1	21.4	0.002
moderate	54.4	3.0	
strong	17.5	45.6	

with variation within and between populations. The areca nut may be placed in a quid along with the piper betle leaf and lime, drunk in a beverage or shredded into pre-packaged pan masala. The areca nut itself may be consumed as a 'wet' or 'dry' solid. The quid may be chewed vigorously by some populations, while in others it is placed in the cheek for a more gentle mastication. All these factors inhibit the development of a robust evidence base, indicating the need to proceed on a case-study basis.

A second outcome has been the recognition that socio-economic trends in South Asia may serve to either reinforce existing patterns of consumption or lead to the development of marketing innovation. There is currently inadequate evidence to argue that the Bangladeshi socio-economic profile will lead to the diffusion of pan masala there, a mass-produced product reflecting the pattern of socio-economic change in India.

Thirdly, a focus on the health and behaviours of the United Kingdom South Asian communities, who make up about half of the United Kingdom ethnic minority population, has developed. This community is not a homogeneous group, differing along variables such as geographic distribution in the United Kingdom, educational attainment and economic prosperity. It cannot be assumed that their patterns of areca nut consumption will be similar. Further data collection should establish factors such as return travel to their families' country of origin where

areca nut consumption started, and any change in this behaviour over time.

Fourthly, accessible and robust data clearly distinguishing between individuals chewing areca nut in a made-up paan, pan masala or with tobacco is limited. Data from East London suggests that, in community samples, a group of adults reported their current areca nut chewing to be in paan without tobacco. This group was clearly distinguishable from a larger group chewing areca nut in paan with tobacco, with a differing consumption frequency, pattern and motivation. Reflecting these consumption patterns, epidemiological outcomes among those who chew paan without tobacco need further clarification against the international consensus reached in 1985.<sup>37</sup>

It may be concluded that the socio-economic aspects of areca nut production and consumption have been largely overlooked, inhibiting the identification of clear conclusions. This research should be multidisciplinary in focus and of high scientific quality. The consumer voice is currently ignored in the development of this research activity.

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## References

- Summers RM, Williams SA, Curzon MEJ. The use of tobacco and betel quid ('pan') among Bangladeshi women in West Yorkshire. *Community Dent Health* 1994;11:12-16.
- Watson P. Does abundant supply of drugs lead to heavy consumption? A Papua New Guinea case study. May 1991 ([www.drugtext.org/articles/912405.htm](http://www.drugtext.org/articles/912405.htm)).
- Islam S, Croucher R, O'Farrell M. Paan ingredients trade in London boroughs of Tower Hamlets and Newham. Summary report of an investigation. London: Tower Hamlets Healthcare NHS Trust/The London Hospital Medical College; 1996.
- Ali M, Hamilton N, Khimani R, Patel S, Thomson S, Bennett J, House K. Sales of South Asian tobacco chewing products in Leicester City. Leicester: Leicester City Council Consumer Protection Service and Leicestershire Tobacco Paan Action Group; 2000.
- Croucher R. Tobacco in paan: implications for nicotine intake, dependence and cessation programmes in Bangladeshi women. Report of a project funded as part of the NHSE Inner City health research and Development Funding. London: Dental Public Health, St Bartholomew's and The Royal London School of Medicine and Dentistry; 1999.
- Rooney DF. Betel chewing traditions in South-East Asia. Kuala Lumpur: Oxford University Press; 1993.
- Dalibard C. The potential for tapping palm trees and prospects for animal production. Paper presented at the 2nd FAO Electronic Conference on Tropical Feeds ([www.fao.org/waicent/faoinfo/agricult/aga/agap/frg/ABSTRACT/DALIBARD.TXT](http://www.fao.org/waicent/faoinfo/agricult/aga/agap/frg/ABSTRACT/DALIBARD.TXT)).
- Bhat TN. Social change and family planning: a study of backward classes. *Man Devel* 1998;20: 115-45.
- Michon G, H de Foresta Juswaro, Levang P. Formal recognition of farmer's rights as a precondition for the re-building of productive and durable community forests in Indonesia: the Damar Agroforests in Krui, Sumatra, 1999 ([www.mtnforum.org/resources/library/michx99a.htm](http://www.mtnforum.org/resources/library/michx99a.htm)).
- Das AN. Perception and attitude towards tree growing in east Nepal ([www.panasia.org.sg/nepalnet/forestry/tree\\_grw.htm](http://www.panasia.org.sg/nepalnet/forestry/tree_grw.htm)).
- Trade briefing: pan masala (<http://iil.indiaonline.com/sect/ftob/ch06.html>).
- Rajsbekar SC. Biomass based power generation in Andaman and Nicobar Islands. *BUN-India Newsletter* 1999;3 ([www.144.16.65.129/~cgplhome/vol\\_31.html](http://www.144.16.65.129/~cgplhome/vol_31.html)).
- Grieve M. A modern herbal (<http://www.botanical.com/botanical/mgmh/a/areca056.html>).
- Kothari Product Range, 1997 (<http://www.newindia.com/kothari/>).
- PT Chempex Jaya, 1999 ([http://www.chempex.com/areca\\_nut.htm](http://www.chempex.com/areca_nut.htm)).
- Need to promote import of areca nut. Proceedings of Indian Parliament, 21.03.97 (<http://alfa.nic.in/lsdeb/ls11/ses4/14210397.htm>).
- Tuli P. Chewing troubles. *Hindustan Times*; 3rd August 1998 (<http://www.hindustantimes.com/nonfram/030898/met.htm>).
- Varma SM. Arecanut marketing to focus on exorcising pan masala stigma. *Financial Express*; January 31st 2000 (<http://www.financialexpress.com/fe/daily/20000131/fco31007.html>).
- Bhaumik A. Pan masala elbows Banarasi pan aside. *Economic Times*; 19th June 1999 (<http://www.economicstimes.com/190699/pageindu.htm>).
- George N. Health Ministry isolated on gutka ban. *Indian Express*, May 9 1998 ([www.expressindia.com/ie/daily/19980509/12950344.html](http://www.expressindia.com/ie/daily/19980509/12950344.html)).
- de Boer K, Fell G. A fresh look at India. *McKinsey Q* 1993;3:116-44 (<http://209.172.171.93/country/frlo93.asp>).
- Kapoor P, Iyengar J. Huge excise cut for pan masala with no tobacco. *Economic Times*; 19th June 1999 ([www.economicstimes.com/190699/19indu01.htm](http://www.economicstimes.com/190699/19indu01.htm)).
- McCrary S Van. The betel nut: an emerging public health threat? (<http://www.law.uh.edu/healthlawperspectives/HealthPolicy/980908Betel.html>).
- The basement shaman, Elgin, Illinois (<http://www.basementshaman.com/>).
- Food and Drug Administration. Statement for the Record by the Food and Drug Administration for the Committee on Resources, House of Representatives. April 13, 2000.
- Code of Practice for the safe handling and storage of paan ingredients in small to medium size retail shops. London Borough of Tower Hamlets Food Safety Team and The Dental School, Barts and The London School of Medicine and Dentistry, 2001.
- The World Bank Bangladesh. Bangladesh 2020: a long-run perspective study (wbln0018.worldbank.org/lo+web+sites/bangladesh+Web.nsf/0704a4348e105b2e462566720023975f/7798edeaba2b94b034625670a0022c0e9).
- Rudat K. Black and minority ethnic groups in England: health and lifestyles. London: Health Education Authority; 1994.
- Nazroo JY. The health of Britain's ethnic minorities. London: Policy Studies Institute/Social and Community Planning Research; 1997.
- Summers RA, Williams SA, Curzon MEJ. The use of tobacco and betel quid ('pan') among Bangladeshi women in West Yorkshire. *Community Dent Health* 1996;11:12-16.
- Pearson N, Croucher R, Marcenes W, O'Farrell M. Dental service use and the implications for oral cancer screening in a sample of Bangladeshi adult medical care users living in Tower Hamlets, UK. *Br Dent J* 1999;186:517-21.
- Bedi R, Gilthorpe MS. The prevalence of betel-quid and tobacco chewing among the Bangladeshi community resident in a United Kingdom area of multiple deprivation. *Primary Dent Care* 1995;2: 3-42.

33. Ahmed S, Rahman A, Hull S. Use of betel quid and cigarettes among Bangladeshi patients in an inner-city practice: prevalence and knowledge of health effects. *Br J Gen Pract* 1997;47:431–4.
34. Pearson N, Croucher R, Marceles W, O'Farrell M. Dental service use and the implications for oral cancer screening in a sample of Bangladeshi adult medical care users living in Tower Hamlets, UK. *Br Dent J* 1999;186:517–21.
35. Asma S. A pilot investigation of betel chewing habit amongst a group of Bangladeshi adolescents in East London. Unpublished MSc thesis. Dental Public Health, University College London and The London Hospital Medical College, 1994.
36. Farrand P, Rowe RM, Johnston A, Murdoch H. Prevalence, age of onset and demographic relationships of different areca nut habits amongst children in Tower hamlets, London. *Br Dent J* 2001; 190:150–4.
37. International Association for Research on Cancer (IARC). Tobacco habits other than smoking: betel quid and areca nut chewing, and some related nitrosamines. Lyons: IARC; 1985.