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Full Length Research Paper

Production and sensory evaluation of food blends from maize-plantain-soybean as infant complementary food

Opara, B. J.[1], Uchechukwu[1], N., Omodamiro, R. M.[2]* and Paul, N.[2]

[1]Michael Okpara University of Agriculture, Umudike, Abia State, Nigeria.
[2]National Root Crops Research Institute, Umudike, Abia State, Nigeria.

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The study was conducted to produce and evaluate food blends from maize- plantain - soybean as infant complementary food. Treatments consist of diet formulated with toasted soya beans flour, ogi flour from yellow maize corn and firm ripe plantain was used for the production of the plantain flour. Six experimental diets were formulated from the above flours, to contain the following percentage ratios: OPBL1 - 50% maize, 25% plantain, 25% soybean; OPBL2 - 50% maize, 20% plantain, 30% soybean; OPBL3 - 50% maize, 15% plantain, 35% soybean; OPBL4 - 50% maize, 10% plantain, 40% soybean; OPBL5 - 50% maize, 5% plantain, 45% soybean; OPBL6 - 33.33% maize, 33.33% plantain, 33.33% soybean. Sensory evaluation of the maize-plantain-soybean composite flours based complementary foods was carried out using 7-point hedonic scale with 20 panelists. Generally, sample OPBL7 was most acceptable by the panelists, though not significantly different (P> 0.05) from samples OPBL6, OPBL5 and OPBL4. However, all samples were generally acceptable by the panelists.

Key words: Soya beans, plantain, maize and sensory evaluation.

INTRODUCTION

The period during which other foods or liquids are given to a young child along with breast milk is considered the period of complementary feeding and any nutrient containing foods or liquids other than breast milk provided the child during this period are defined as complementary foods (WHO, 1998).

Thus, it is essential that infants receive appropriate, adequate and safe complementary food to ensure the right transition from breastfeeding to the full use of family foods (WHO 2003).

Lack of appropriate feeding can set up risk factors for ill-health. The life–long impact may include poor school performance, reduced productivity, impaired intellectual and social development or chronic diseases (Nestel et al., 2003). In developing countries, complementary foods are mainly based on starchy tubers like cassava, cocoyam and sweet potato or on cereals like maize, rice, wheat, sorghum and millet. Small children are normally given these staples in the form of gruels that is mixed with boiled water or boiled with water. When prepared in this way, the starch structures bind large amounts of water, which results in gruels in high viscosity (Hellstrom et al., 1981).

Seed proteins especially from leguminous sources such as soybean have been put forward as potentially excellent sources of protein for the nutritionally quality upgrading of starchy roots and tubers for use in baby foods in countries which import all their milk requirement (Okaka and Okaka, 1990).

Hence the objective of this research work is to exploit the nutritive potentials of yellow maize, plantain and soybean for production of easy to prepare complementary food which is nutritive, and available to low earners in developing countries.

MATERIALS AND METHODS

Production of the experimental complementary foods

Production of maize into ogi flour

The method of yellow maize fermentation adopted in this study

*Corresponding author. E-mail: majekdamiro@yahoo.com.

followed the method of Baningo and Akpapunam (1999) and Omueti et al. (2009) with modification for the production of *ogi* flour. Ten (10) kg of cleaned yellow maize grains were sorted, washed and steeped in tap water for two days in a large basin. The contents were allowed to ferment at room temperature for 0 to 48 h. The steeped water was changed with fresh water after each day. The steeped water was decanted and the fermented cereal ground to slurry in a hydraulic mill. The slurries were sieved through a fine sieve (muslin cloth) with excess water. The seed coat and other coarse particles were discarded and the sediment allowed to settle and squeezed to remove excess water. The sediment was dried at 60°C for 12 h. The dried samples passed through the mill a second time and sieved to obtain fine particles. The 'ogi' flour was then stored in sealed air tight in food grade polyethylene bag for analysis (Figure 1).

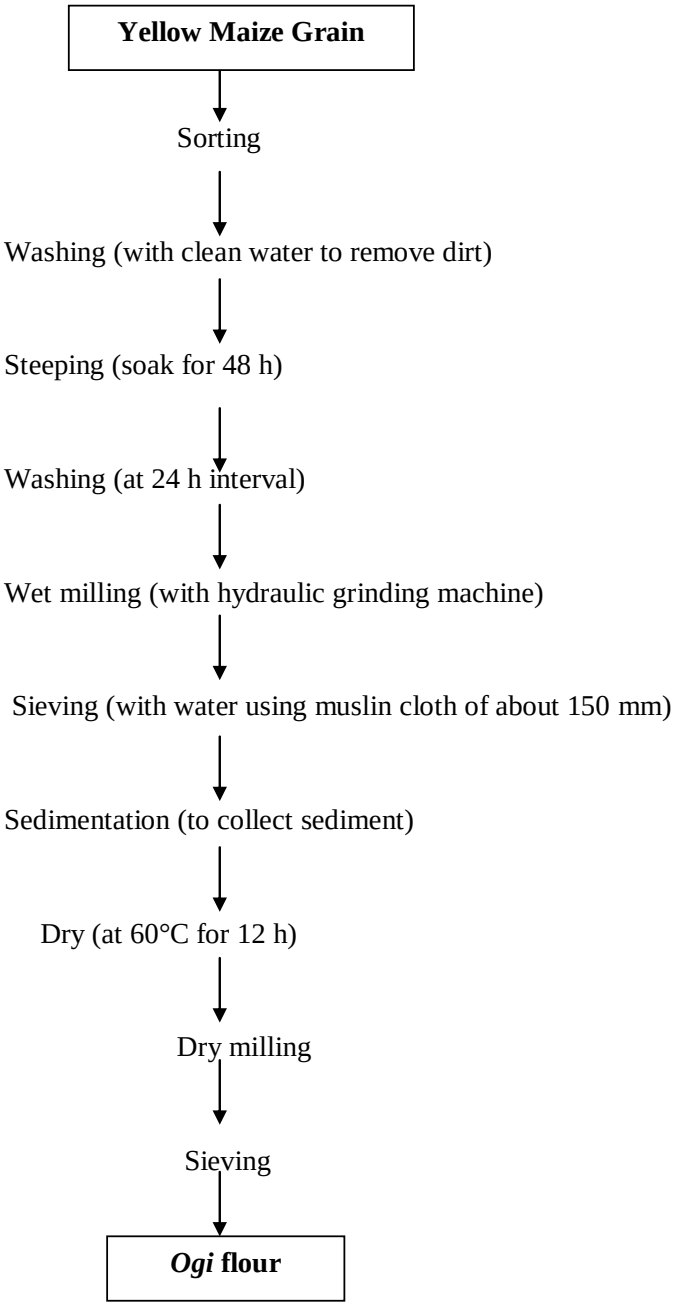

Figure 1. Flow chart for the production of *ogi* flour.

Production of firm ripe plantain into flour

The method of Ogazi (1996) was used for the production of the plantain flour. Matured, firm ripe plantain which weighed 7.4 kg was washed with clean water and each fruit was cut into three pieces and blanched (hot water) for 20 min, peeled and sliced. The sliced plantain was then oven dried at 60°C for 12 h. The dried plantain was milled to powder with a milling machine and sieved with muslin cloth of 150 mm. The resulting flour was then packaged in sealed air tight food grade polyethylene bags for analysis (Figure 2).

Production of soybean into soybean flour

The method of Omueti et al. (2009) was adopted for the production of soybean flour with modification. Soybean grain was sorted, washed and blanched for 45 min. It was dehulled and toasted for 30 min. The toasted grain was then oven dried at 60°C for 15 min, milled and sieved to fine flour. The flour was packaged and sealed with food grade polyethylene bags for analysis (Figure 3).

Formulation of six complementary food products (Maize-Soybean-Plantain) - MAMUSOY complementary food (Mamusoy)

This is according to the method of Omueti et al. (2009). The complementary diets were prepared as shown in Figure 4. Putting the following into consideration, maize is carbohydrate present in constant ratio; soybean ratio is higher than that of plantain, being a baby food the protein content should be high. The plantain used was firm ripe, the plantain is to supply micro nutrient. The six experimental diets were formulated to contain the following percentage ratios:

OPBL1 - 50% maize, 25% plantain, 25% soybean
OPBL2 - 50% maize, 20% plantain, 30% soybean
OPBL3 - 50% maize, 15% plantain, 35% soybean
OPBL4 - 50% maize, 10% plantain, 40% soybean
OPBL5 - 50% maize, 5% plantain, 45% soybean
OPBL6 - 33.33% maize, 33.33% plantain, 33.33% soybean

The flow chart for the production of the six complementary food products (MAMUSOY) is shown in Figure 4.

SENSORY EVALUATION OF THE COMPLEMENTARY FOOD BLENDS

The method of Iwe (2002) was used for sensory evaluation of maize-plantain-soybean composite flours based complementary foods (MAMUSOY). The effect of processing methods on the general acceptability of composite flours and the colour, aroma, taste /mouth-feel, and general acceptability of complementary foods were evaluated using a 7-point hedonic scale. The 7-hedonic scale ranged from dislike very much, through neither like nor dislike, to like very much. The complementary foods prepared to panelists for evaluation were prepared by dissolving 100 ml of clean water with 50 g complementary food (flour), after which 150 ml of boiling

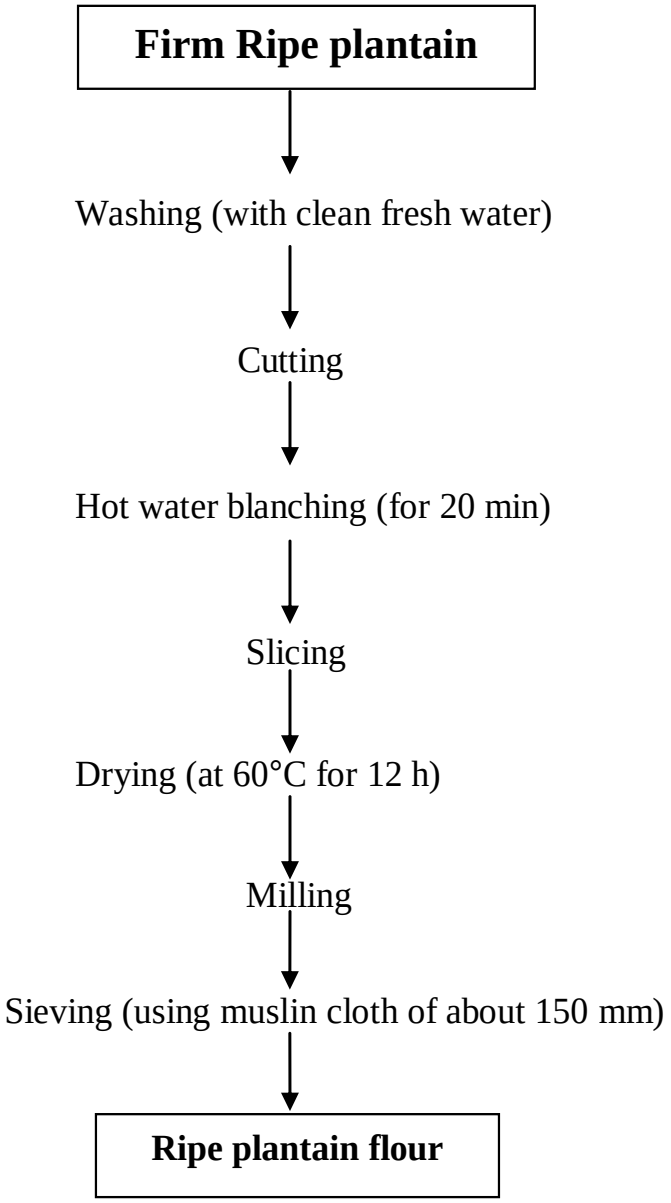

Figure 2. Flow chart for the production of plantain flour.

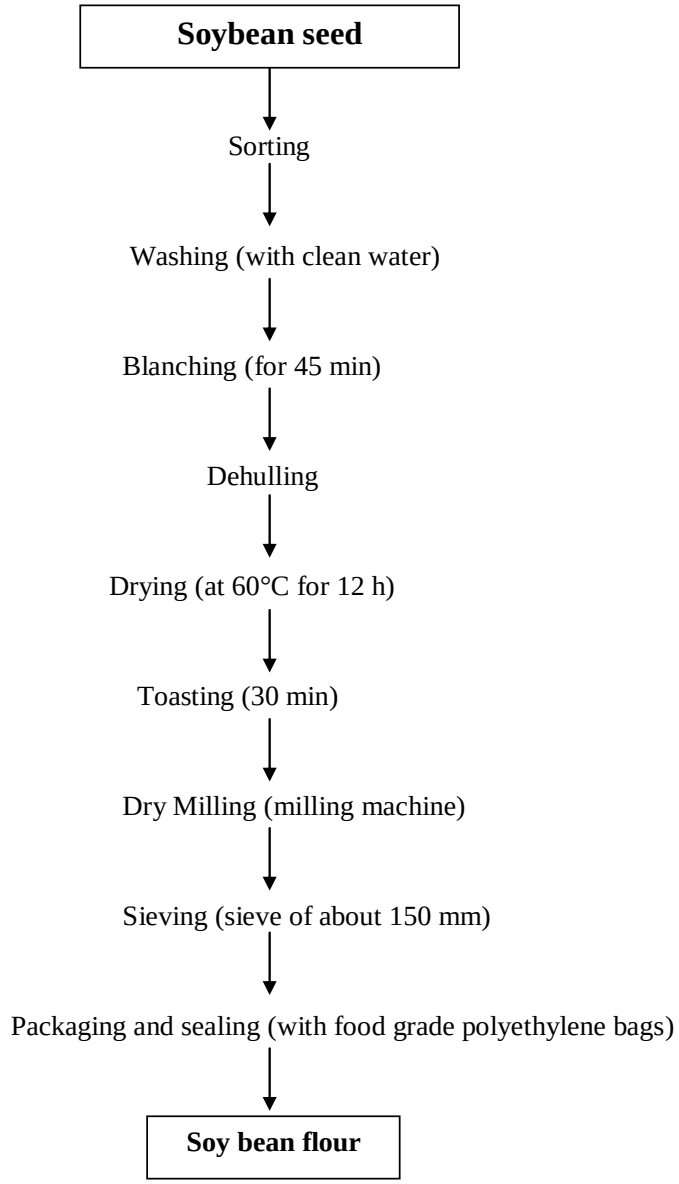

Figure 3. Flow chart for the production of soybean flour.

water (100°C) was used to reconstitute the sample of MAMUSOY which was brought to a boil for 3 to 5 min, and 2 g of sugar was added to the reconstituted samples. Panelists (trained and semi trained) were drawn from staff (males and females) of Post Harvest Technology Programme of National Root Crops Research Institute, Umudike, and students (Food Science and Technology) of Michael Okpara University of Agriculture Umudike. The samples were presented in identical sample containers coded with 4-digit random numbers, each sample having a different number. The sample order was randomized for each panelist.

The samples were presented all at once to enable the panelists evaluate the samples if desired and make comparisons between the samples. Nutrend (a maize-soya based baby food manufactured by NESTLE) was used as the reference sample. The evaluation was carried out under a conducive environment for sensory evaluation.

SENSORY EVALUATION OF COMPLEMENTARY FOOD BLENDS

In terms of colour, sample OPBL7 was most acceptable by the panelists (6.80) but was not significantly different ($P > 0.05$) from that of samples OPBL8, OPBL4 and OPBL2.

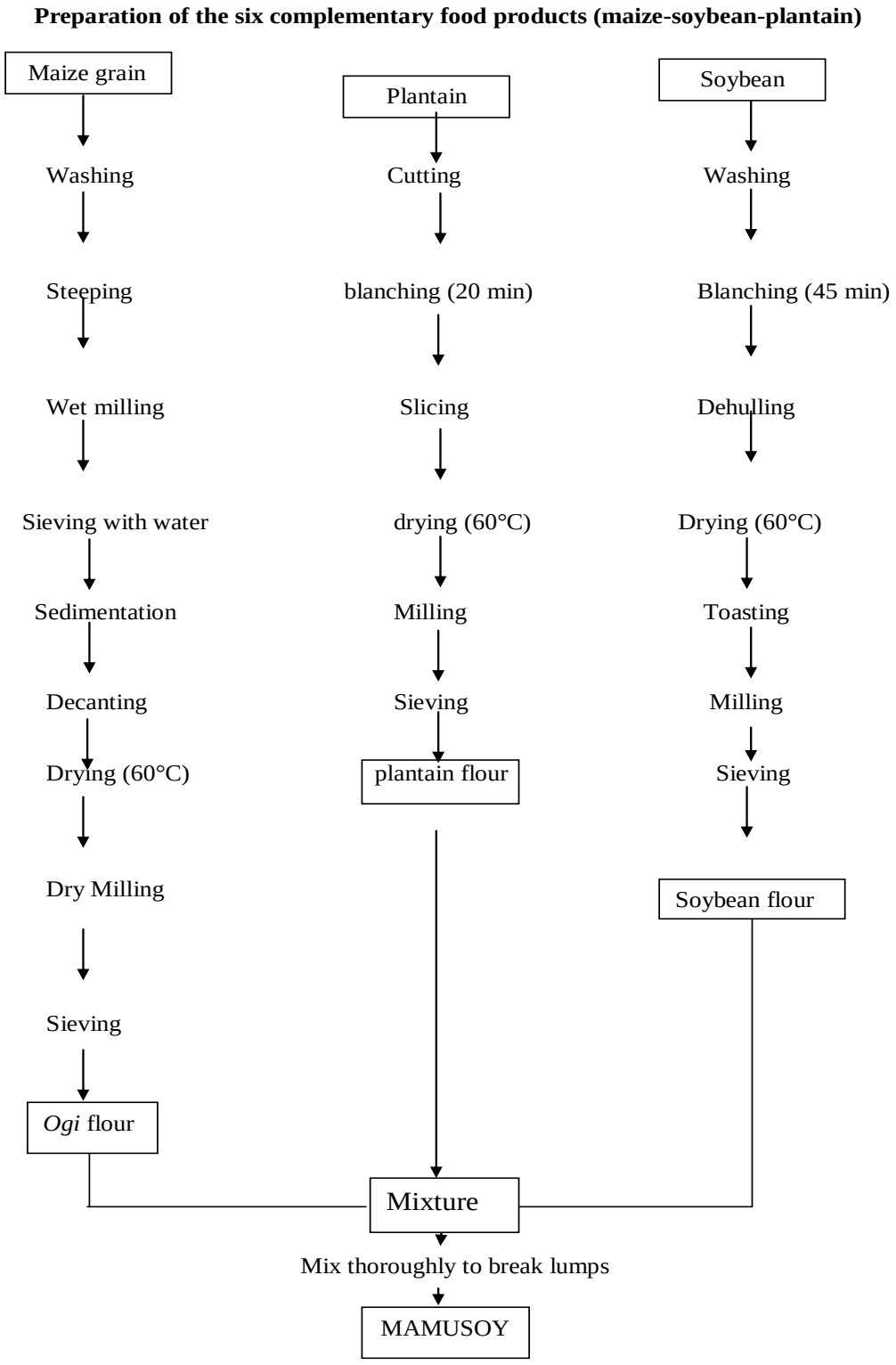

Figure 4. Flow chart for the production of six complementary food products (MAMUSOY).

However colour of all samples were acceptable by the panelists.

The taste of all the samples were general acceptable for taste and there was no significant difference (P>0.05).

The aroma was most acceptable in sample OPBL7 (6.80) and least acceptable in sample OPBL8 (5.00). Sample OPBL7 was not significantly different (P>0.05) from samples OPBL6, OPBL5, OPBL4 and OPBL2.

Table 1. Mean sensory scores of maize-plantain-soybean complementary food "MAMUSOY."

Sample	Colour	Taste	Aroma	Texture	General acceptability
OPBL1	5.80^{bc}	5.60^{a}	5.50^{bc}	5.70^{a}	5.6^{bc}
OPBL2	5.90^{abc}	5.90^{a}	5.90^{abc}	5.80^{a}	5.80^{bc}
OPBL3	5.40^{bc}	5.50^{a}	5.60^{bc}	5.60^{a}	5.30^{c}
OPBL4	5.90^{abc}	5.60^{a}	5.90^{abc}	5.70^{a}	5.90^{abc}
OPBL5	5.30^{c}	5.70^{a}	5.90^{abc}	6.00^{a}	5.90^{abc}
OPBL6	5.10^{c}	6.30^{a}	6.00^{ab}	6.10^{a}	6.20^{ab}
OPBL7	6.80^{a}	6.40^{a}	6.80^{a}	5.50^{a}	6.70^{a}
OPBL8	6.30^{ab}	5.40^{a}	5.00^{c}	5.50^{a}	5.60^{bc}
LSD (P=0.05)	0.977	1.025	0.992	1.061	0.879

Means in the same column with different superscript are significantly different at ($P < 0.05$) LSD = Least square difference. RPLA = Raw plantain; RSOY = raw soybean; RMAY = raw maize; MUSA = plantain flour; WINN = soybean flour; RMO = *Ogi* flour; OPBL1 (50:25:25); OPBL2 (50:20:30); OPBL3 (50:15:35); OPBL4 (50:10:40); OPBL5 (50:5:45); OPBL6 (33.33:33.33:33.33).

However, all samples were generally acceptable for aroma.

While in texture, sample OPBL6 was most acceptable by the panelist (6.10) and least acceptable in samples OPBL7 and OPBL8 (5.50). There was no significant difference ($P > 0.05$) in the texture of the samples and all were acceptable by the panelists.

Generally, sample OPBL7 was the most generally acceptable by the panelist (6.7), though not significantly different ($P > 0.05$) from samples OPBL6, OPBL5 and OPBL4. However, all samples were generally acceptable by the panelists (Table 1).

Conclusion

Sensory evaluation showed that OPBL5 (50:5:45) and OPBL6 (33.33:33.33:33.33) were most acceptable to the panelists among the six complementary foods as well as higher in nutrient. The results obtained in this study equally show that the potential exists for blends OPBL5 (50:5:45) and OPBL6 (33.33:33.33:33.33) as income generation for the rural populace if the technology is adopted.

REFERENCES

Baningo EB, Akpapunam MA (1999). Physico-chemical and Nutritional Evaluation of protein-enriched fermented maize flour. J. Manage. Technol., 1(1): 30-36.

Hellstrom A, Hermansson AM, Karlsson A, Liungquist B, Melander D, Svanberg U (1981). "Dietary bulk as a limiting factor for nutrient intake in pre-school children. II. Consistency as related to Dietary Bulk – A model study". J. Trop. Pediatr., 27: 127.

Nestel P, Briend A, de Benoist E, Decker E (2003). Complementary Food Supplements to Achieve Micro-Nutrient Adequacy for Infants and Young Children J. Pediatr. Gastroenterol. Nutr., 36: 316 – 328.

Ogazi PO (1996). Plantain: Production, Processing and Utilization. Paman and Associates Ltd, Akv Okigwe, Imo State, Nigeria. Afr. J. Biotechnol., p. 30.

Okaka JC, Okaka ANC (1990). Food: Composition Spoilage and shelf-life extension. OCJANCO Academic Publishers. Enugu.

Omueti O, Bolanle O, Olayinka J Olukayode A (2009). Functional Properties of Complementary Diets Developed from Soybean (*Glycine Max*), Groundnut (*Arachis hypogea*) and Crayfish (*Macro brachium* spp.). Elect. J. Environ. Agric. Food Chem., 8 (8): 563-573.

WHO (1998). Complementary feeding of young children in developing countries: A review of current scientific knowledge. WHO/NUT/98.1 Geneva, World Health Organisation.

WHO (2003). Feeding and Nutrition of Infants and Young Children: Guidelines for the WHO European region with emphasis on the former Soviet Union. WHO Regional Publications, European Series, No. 87, pp. 1-296.