

World Wildlife Fund - Guianas
Grant Agreement FG-64
Paramaribo, Suriname



Maroon perceptions of small-scale gold mining impacts, II

A survey in mining camps and affected communities
in Suriname and French Guiana

Final report by
M. Heemskerk & M. Oliveira

With the assistance of:
D. Abese, L. De Dehn, C. Dehli
S. Kasketi, C. Menig, R. Agrang
I. Poeketi, P. Oliveira and R. Pané.

Paramaribo, Suriname
March 31, 2004

SUMMARY¹

This report presents an analysis of local perceptions of the socioeconomic, ecological, and health impacts of small-scale gold mining. Data were collected among Maroons –forest peoples of African descent- in four main mining regions of Suriname and French Guiana, South America. Nine research assistants conducted survey interviews with 173 small-scale gold miners and 423 non-mining members of Maroon communities surrounding the mines. Respondents accounted how they acquired knowledge; what benefits gold mining brought to their families and communities; their opinions about negative mining impacts; and imagined strategies to reduce these negative impacts.

The researchers find that access to information in the forest is extremely poor. This is especially true in Suriname, where the vast majority of forest peoples are excluded from access to the national communication network; postal services, phone, and newspapers. Of all media, radio has the widest reach in terms of geography and population diversity. Television is popular as well. However, the limited distribution of TVs and the poor reach of national broadcasting networks narrow its effectiveness as a communication vehicle.

Providing employment and sustaining families were seen as the most positive effects of small-scale gold mining. Forty-five percent of non-mining community members said that mining brought ‘nothing’ good to them or their communities. Nevertheless, many of them directly or indirectly earned income from mining, for example by selling goods and services to miners. Among the different occupational groups in the mines, mine operators earned the highest incomes but they also had most investment costs. The average incomes of other gold miners -including pit-workers, cooks, and transport providers- fell roughly between 35-55 g of gold per month. We cannot conclude that gold miners are economically better off than other members of Maroon communities.

Male and female gold miners and non-miners agree about what are the negative effects of small-scale gold mining, but rank these effects differently in order of importance. Maroon women, who are responsible for bringing clean water to their households, are most affected by the sedimentation of creeks. Hence they are most concerned about water pollution. Gold miners, who are exposed to the risky mining environment on a daily basis, care more than others about occupational safety and violent crime.

¹ This summary is the revised and more extensive version of the summary provided in the first 40 paper copies of the report that were distributed.

The survey data confirm earlier qualitative findings (See report 1). Namely, forest peoples are poorly informed about two main health hazards caused by small-scale gold mining: malaria and mercury pollution. While virtually everyone knows that malaria is transmitted by mosquitoes, less than quarter of people believe that a bite of the malaria mosquito is the only cause. The most common misperception is that one contracts malaria from drinking polluted water or water with dead mosquitoes. Gold miners did not report more incidences of malaria than non-mining Maroons. Regional differences are more profound, with residents of the Lawa and Tapanahoni regions facing most malaria risk. Maroons in all regions are sleeping with mosquito netting, in addition to using a variety of other strategies to reduce the chances of contracting malaria.

People have heard mercury is dangerous but few know why. Virtually no-one can name the symptoms of mercury poisoning, knows what fish or parts of fish accumulate the toxic metal, or is aware of techniques to reduce mercury spillage in gold extraction. Small-scale gold miners are relatively better informed than others. For example, most of them know that mercury vapor from burning the mercury–gold amalgam is hazardous, versus only a third of non-mining Maroons. Nearly half of respondents knows that mercury intoxication is possible through the consumption of fish, but this knowledge has not changed consumption patterns; more than half of interviewees reported eating fish daily or at least a few times per week. Lawa Maroons were best informed about mercury due to field visits by French mercury researchers to this region.

Occupational safety was another concern. More than a third of miners had been injured on the workplace, for example by a fallen tree branch or an accident with machinery. In addition, most gold miners experienced a variety of other job-related health problems such as back-aches, skin irritations, and swollen feet. Confronted with health problems, miners typically rely on self treatment or the help of friends. Less than half of gold miners said they had gone to a doctor, even though most have health insurance. Criminals form another risk, with a quarter of surveyed miners having been a victim of violence or crime.

Gold miners and non-mining Maroons agree that small-scale gold mining is mostly to blame for today's shortage of clean water. Garbage was named as the second most serious source of water pollution. Indeed, the absence of adequate garbage processing is becoming a serious problem in today's consumer society. Stopping small-scale gold mining was the most frequently suggested solution to improve water quality. Other ideas centered on ways to prevent mine tailing from flowing into creeks and rivers.

Only a quarter of survey respondents attribute the diminishing respect for village elders to gold mining. The way children are raised and violent movies

are felt to be more important sources of disrespect. Brazilian migration is generally perceived in negative terms. Gold miners are slightly more positive than others, valuing garimpeiros for their mining skills and knowledge. Underlying the widespread dislike of Brazilians are the increased levels of violent crime attributed to this population group. In addition Brazilians are blamed for taking away all gold, the spread of HIV/AIDS, and water pollution.

Few Maroons offered explicit solutions to problems in the small-scale gold mining sector. Respondents did indicate a need for better communication between local authorities, gold miners, and the national government. The government was asked for assistance in improving public health and controlling criminality, among others by installing police and military posts in the forest. In addition, alternative employment and better educational facilities were identified as critical assets in expanding the range of livelihood options in the interior. The lack of unity among gold miners was seen as a barrier to addressing mining-related problems. Some believed that miners could make a positive contribution by giving money to the village and by self-organization. Among the other suggested solutions were removing Brazilian miners, stronger law enforcement, and banning small-scale mining altogether.

Work with one of the large-scale mining companies was the most popular alternative to small-scale gold mining in the eyes of current miners. A labor contract with such a company was considered attractive for the provision of health insurance and other social benefits, in addition to a regular and stable income. Next on the list of alternative employment options were a government job in the forest and wage labor in the private sector. Wage labor, however, was disliked for its low wages and strict work schedule. Indeed, few miners were willing to leave the small-scale gold mining industry for monthly wages under US\$ 200, which is more than a company is likely to pay for manual labor.

The results indicate an urgent need for information and tools that help Maroon miners and non-mining community members cope with both the symptoms and root causes of negative mining impacts. The most effective means to bring this information would be through radio broadcasting in the local languages, supported by a TV documentary and posters. Local Maroons should actively participate in the design, implementation, and evaluation of these materials. The projected awareness and information campaign must breach the diversity within the Maroon population in terms of gender, income, occupation, and other socioeconomic factors. Because the root causes of mining problems lay in mining operations, small-scale gold miners – particularly mine owners- should be especially targeted. A well informed local population will be a more powerful ally in efforts to create a healthier, less polluting, economically viable, and socially responsible small-scale gold mining industry.

ACKNOWLEDGEMENTS

We wish to thank numerous Maroon men and women in Suriname and French Guiana for their hospitality, insights, and participation in the research. Data collection would not have been possible without the aid of the community members and gold miners who shared transportation, meals, homes, and information. A special word of gratitude is reserved for the inhabitants of the villages of Drietabbetje, Mooitaki, Koffiekamp, Balengsula, Mooisanti, Monfina, Grand-Santi, Nason, Snesi kondre, Betel, and Langetabbetje, and for the gold miners of Sella Creek, Brokopondo (106), Benzdorp, and the Nassau mountains. We thank the mining company SURALCO for providing logistical assistance for work in the Nassau Mountains. Logistic support from the Faculty of Technological Sciences and the Faculty of Social Sciences of the University of Paramaribo is also gratefully acknowledged. Many other people in Suriname and the Netherlands shared advice, insights, and statistical software; we appreciate the help of all these people. Financial support was provided through a World Wildlife Fund-Guianas grant under the program on *Gold Mining Pollution Abatement* (project# FG-64).

Opinions expressed in this report are those of the authors and do not necessarily reflect the views of WWF-Guianas or of other institutions the authors are affiliated with. The authors also are responsible for all errors in translation and interpretation.

Marieke Heemskerk & Marilyn Oliveira

Paramaribo, Suriname
March 31, 2004

Copyright statement: The pictures, figures, and text in this report may not be duplicated without prior permission from the authors.

TABLE OF CONTENTS

| | |
|---|----|
| SUMMARY | 1 |
| ACKNOWLEDGEMENTS | 4 |
| TABLE OF CONTENTS | 5 |
| LIST OF FIGURES, TABLES, AND PICTURES | 7 |
| I INTRODUCTION: POVERTY & INFORMATION | 9 |
| II METHODS | 11 |
| 1. Study site | 11 |
| 2. Study population | 13 |
| 3. Data collection and analysis | 14 |
| III ACCESS TO INFORMATION | 16 |
| 1. Media access | 16 |
| 2. Literacy and language skills | 18 |
| IV POSITIVE EFFECTS | 20 |
| 1. Direct and indirect income from mining | 20 |
| 2. Contributions to community wellbeing | 22 |
| V NEGATIVE EFFECTS | 23 |
| VI MALARIA | 24 |
| VII OCCUPATIONAL SAFETY | 25 |
| 1. Accidents and other health problems | 25 |
| 2. Treatment and insurance | 27 |
| VIII WATER POLLUTION | 27 |
| IX MERCURY | 29 |
| X RESPECT FOR VILLAGE ELDERS | 31 |
| XI BRAZILIAN MIGRATION | 32 |
| 1. Positive impacts | 32 |
| 2. Negative impacts | 32 |
| XII SOLUTIONS | 33 |
| 1. The government | 34 |
| 2. Communities | 34 |

| | |
|--|----|
| 3. Gold miners | 35 |
| 4. Large-scale mining: a viable alternative? | 35 |
| 5. Alternative employment | 36 |
| XIII CONCLUSIONS | 37 |
| VIV RECOMMENDATIONS FOR AN INFORMATION CAMPAIGN | 38 |
| 1. How to disseminate information | 38 |
| 2. Information for whom? | 39 |
| 3. What information is critically needed? | 40 |
| CITED SOURCES | 41 |
| APPENDIX A. SURVEY | 42 |
| APPENDIX B. PLANTS OF WHICH THE STEM, BARK, OR LEAFS ARE USED AS FOREST MEDICINE AGAINST MALARIA | 53 |

LIST OF FIGURES, TABLES, AND PICTURES

FIGURES

| | | |
|--------|---|----|
| II.1 | Location of villages and mining sites where surveys were conducted | 9 |
| III.1 | Proportion of people obtaining information from newspapers, TV, and radio | 14 |
| III.2 | Preferred medium to receive information | 15 |
| III.3 | Frequency of contact with the urban and coastal area | 17 |
| IV.1 | Perceived positive effects of small-scale gold mining according to miners and non-mining villagers | 18 |
| IV.2 | Distribution of revenues for the four main job categories in the small-scale gold mining industry | 19 |
| IV.3 | Possession of consumer goods among miners and non-mining community members | 20 |
| V.1 | Negative effects of small-scale gold mining in the opinion of gold miners (N=170) and male (N=156) and female (266) Maroon individuals not working in the mining areas. | 21 |
| VI.1 | Causes of getting malaria according to Maroon respondents (N=594) | 22 |
| VII.1 | Violent crime experienced by survey respondents working in the mining area | 24 |
| VIII.1 | Perceived causes of water pollution | 26 |
| VIII.2 | Suggested solutions to abate water pollution from small-scale gold mining (N=260) | 26 |
| IX.1 | Behaviors that are believed to place one at risk of mercury pollution | 27 |
| X.1 | Perceived causes for the lack of respect (N=504) | 29 |
| XI.1 | Perceived positive impacts of Brazilian migration | 30 |
| XI.2 | Perceived negative impacts of Brazilian migration | 31 |

| | | |
|-------|--|----|
| XII.1 | How much would an alternative job have to pay before miners would consider leaving the small-scale gold mining industry? | 34 |
|-------|--|----|

TABLES

| | | |
|-------|--|----|
| II.1 | Information about the research villages | 10 |
| II.2 | Research population | 11 |
| III.1 | Preferred moment of the day to listen to the radio or watch television | 16 |

PICTURES

| | | Source | |
|---|---|-----------|----|
| 1 | Satellite installations at Grand Santi | Heemskerk | 15 |
| 2 | Poster promoting safe sexual practices | Heemskerk | 16 |
| 3 | Transport provider trying to get his ATV out of the mud | Heemskerk | 19 |
| 4 | Local Maroon preparing leaves to make medicinal bath | Heemskerk | 23 |
| 5 | Pit worker using all his force to control water hose | Olivieira | 24 |
| 6 | Local Maroon proudly showing his catch for the day | Heemskerk | 28 |

I. INTRODUCTION: POVERTY & INFORMATION

This report presents the results of a study on Maroon perceptions of small-scale gold mining impacts in Suriname and French Guiana. Three questions motivated the study:

- 1) What do gold miners and non-mining members of affected communities know, and what critical information is lacking, about the impacts of small-scale gold mining?
- 2) What benefits does this mining sub-sector bring to gold miners, their families, and communities surrounding mining areas?
- 3) What opinions and ideas do local stakeholders have about strategies to remedy problems in the small-scale gold mining industry?

At the roots of these questions are concerns about the impacts of small-scale gold mining activities on the forests and forest populations of Suriname and French Guiana.

Our objective is to provide baseline data for an awareness program that will inform the local population on these impacts, so that ultimately structural solutions concerning these issues can be found.

The report, then, starts from the premise that knowledge and information are fundamental resources for development and poverty alleviation. Foremost, information allows people to expand their choices. Information about new markets, weather forecasts, and price trends, for example, helps small farmers earn higher and more stable incomes. Informed people also are better prepared to avert and cope with shocks; unexpected events that trigger a decline in well-being such as extreme weather events, illness, and political instability. In the case of serious disease incidences, for example, the costs of lost labor and treatment can pull poor families into more destitute conditions. Knowledge and information about disease causes, cures, and health insurance programs will help families reduce both the chances of getting ill and the impacts of being ill.

Furthermore, knowledge empowers people by making them more vocal participants in political decision-making. Knowing the ways to financial, legal, and technical support and information gives people the power to take action. A better informed citizenry can demand and monitor greater transparency and accountability in the activities of governments and firms.

For these and other reasons, information and knowledge are invaluable assets in policy efforts aimed at building more sustainable livelihoods in the poor rural areas of Suriname and French Guiana. These resources, however, are underprovided. Inadequate educational facilities combined with poverty make that many Maroon children, especially girls, leave school prematurely. Most Maroons who responded to our survey had not finished elementary school and almost a third did not speak either Dutch or French, the national languages. The absence of national media and poor performance of local communication networks further deprive forest communities from news and information. Meanwhile high costs prevent people from traveling to the city, where relevant information could be obtained.

The above mentioned obstacles make that gold miners and the members of communities surrounding small-scale gold mines remain poorly informed about the ways mining affects their health and well-being, and about what can be done to mitigate harmful impacts. For example, erroneous ideas persist about malaria, which is arguably the most serious threat to public health in the interior. Knowledge about mercury contamination is virtually non-existent. As we will show in the following pages, interior populations are aware that small-scale gold mining brings besides economic benefits also many problems. The content and extend of these problems, as well as mitigation strategies, remain a mystery to exactly those people who are most affected.

Data were collected through a knowledge-awareness-perceptions survey, which was implemented in four different mining regions in Suriname and French Guiana. The responses also help identify the most effective media to disseminate information. And they will, ideally, initiate a national discussion on grassroots and public actions that will contribute to the development of more sustainable livelihoods in small-scale gold mining communities.

This report proceeds as follows. The methods section describes the research sites, population, and methods used for data collection and analysis. Turning to the results, we begin with an evaluation of access to news and information. We wanted to know how people usually receive and prefer to receive news. This section is followed by an analysis of the positive impacts of gold mining, which discusses earnings and what people do with them. The subsequent chapters on negative impacts deal with the following topics: malaria, occupational safety, water pollution, mercury poisoning, and loss of respect for village elderly. Following is an assessment of local perceptions on Brazilian migration. The last data chapter presents local perceptions on strategies to improve the well-being of Maroons working in and living around the mines. The conclusion synthesizes local responses to the above questions, and we conclude with recommendations for an awareness and education campaign, which is direly needed.

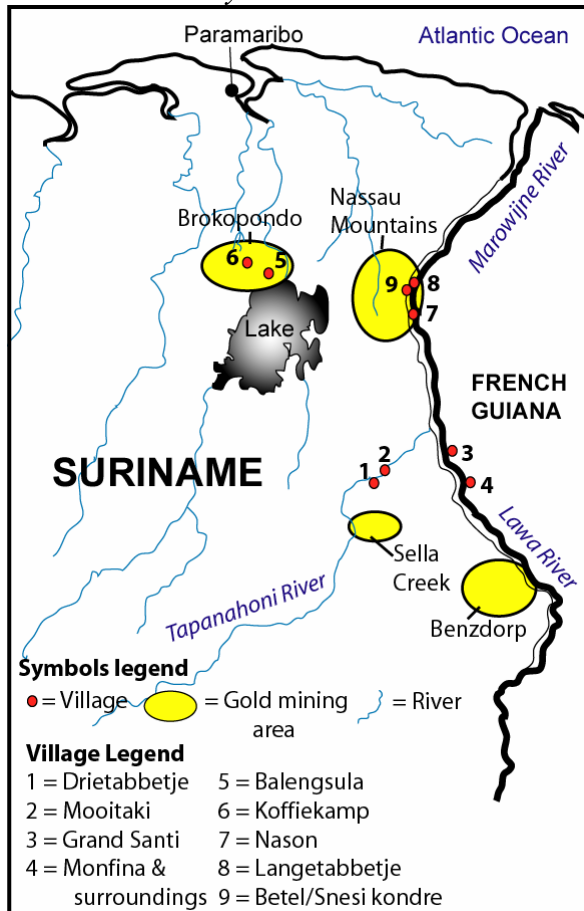
The governments of Suriname and French Guiana and non-governmental organizations in these countries have expressed dedication to support the development of an awareness and education campaign for the interior. Answers to the questions posed in the beginning should help design and execute a campaign that is on one wavelength with knowledge levels, daily life realities, and perceptions of the target population.

II. METHODS

1. Study site²

Research was conducted in at least two Maroon villages and one mining site in each of four major mining regions along the Lawa, Tapanahoni, and Marowijne Rivers, and in the district of Brokopondo (Figure 1). All mining regions and most villages are located in Suriname; only the villages along the Lawa River are situated in French Guiana. The study villages and mining sites are displayed in Figure II.1.

Figure II.1. Location of villages and mining sites where surveys were conducted



Villages differed in their size, infrastructure, distance from the coast, and access to public services. These features, which shape people's access to information and quality of life in general, are summarized in Table II.1. The Tapanahoni villages of Drietabbetje and Mooitaki and the Lawa village of Monfina are most isolated. They are situated at the greatest distance from the urban centre, cannot be reached by road, and have no access to public electricity. It takes the inhabitants of these villages at least an entire day to reach the city, and more in the dry season when water levels are low.

All villages feature stores with the most basic groceries. Some of these stores also are cantinas that serve prepared food and show video in the evening hours. All research villages but Mooitaki have an elementary school, and Grand Santi also offers secondary education. The provision of other public services is severely lacking. Only Mooitaki and Grand Santi, have reliable access to clean

drinking water. Also, few villages have an adequate electricity net or sewage system. Drietabbetje and Grand Santi have public telephones, and one can use a mobile phone in the Brokopondo villages.

French Guiana Maroons are, on average, relatively wealthier than Maroons in the Suriname villages, and more likely to own expensive consumer goods. When looking at

² We described the Suriname small-scale gold mining industry in greater detail in the precursor to this report (Heemskerk and Oliveira 2003). Readers not familiar with the local mining situation are referred to this report.

non-mining community members only, we find that 60.5 % of respondents from the Lawa villages owns a refrigerator, versus only 19.3 % of respondents from the Tapanahoni and 25.6 % of surveyed Marowijne residents. Among the Suriname villages, we find that the communities in the Brokopondo district, closest to the capital city of Paramaribo, are relatively best off. The inhabitants of these villages have better access to public jobs, industrial wage labor, and electricity. They also pay less for travel to town and as a result, prices of goods in the community are lower.

The mining sites also differ considerably. Sella Creek and Benzdorp are most isolated; it takes approximately three days by boat from Albina to get to these places. More hurried travelers can fly to (close to) Benzdorp and to about ½ days boat travel from Sella Creek. Out of reach of telephones, gold miners use radio transmission to communicate with one another and the city. The different sites attract different populations of miners; Brazilians dominate the mining population in the Nassau mountains, whereas virtually only local Maroons are working in Sella Creek. This population difference has implications for the work organization, health, violence, and social conditions in the mines.

Table II.1. Information about the research villages

| Village ¹ | MT | DT | GS | MF | BS | KK | LT | N |
|--|------------------|------------------|------------------|------------------|-----|-----|-----|------|
| Ethnic group(s) N=Ndyuka, S=Saramaka, P=Paramaka | N | N | N | N | S | NS | P | P |
| Inhabitants | 162 ² | 479 ² | 300 | n/a | 800 | n/a | 650 | 1200 |
| Houses - inhabited | 70 | 151 | 130 | 23 | n/a | 250 | 350 | 150 |
| Number of churches | 0 | 0 | 2 | 0 | 1 | 1 | n/a | 1 |
| Number of stores | 5 | n/a | 7 | 4 | 5 | 3 | 4 | 3 |
| Road access for motorized vehicles | No | No | No | No | Yes | Yes | No | No |
| Distance to nearest school (km) | 3 ³ | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Distance to nearest clinic (km) | 3 | 0 | 0 | 21 | 0 | 0 | 0 | 0 |
| Drinking water | Yes | No | Yes | Y/N ⁴ | Yes | No | No | No |
| Public electricity net | No | No | Yes | Y/N ⁴ | Yes | Yes | Yes | Yes |
| Sewage system | Yes | No | Y/N ⁴ | No | No | No | No | No |
| Telephone | No | Yes | Yes | No | Yes | Yes | No | No |
| Distance to Par'bo (km) ⁵ | 300 | 303 | 277 | 298 | 100 | 114 | 186 | 199 |
| Distance to Par'bo (hr) ⁶ | 12 | 12 | 10 | 12 | 3 | 3 | 5 | 6 |

¹ Key to village codes: MT=Mooitaki, DT=Drietabbetje, GS=Grand Santi, MF= Monfina and surrounding settlements, BS=Balengsula, KK=Koffiekamp, N=Nason, LT=Langetabbetje

² Adults only

³ Theoretically there is a school in the village of Mooitaki, but it closed down in 2002 and has not yet been reopened.

⁴ Only part of the village has access.

⁵ Distances are real travel distances, following the course of water and land ways. The distance to Langetabbetje is measured over the road.

⁶ Travel times are measured going down-streams, from the village to Paramaribo. When traveling stream upwards, the trip will take up about 50% more time.

2. Study population

A total of 596 Maroon individuals responded to the survey (Table II.2). Of these people, 423 were community members who were not working in the mines at the moment of the interview. The remaining 173 Maroons in the sample population were small-scale gold miners. For the purpose of this study, we consider gold miners everyone working in the mining area. We use this broad definition because perceptions are shaped by daily experiences and interactions in the immediate working and living environment. Individuals learn and develop ideas about mining from proximity to the extraction activities and conversations with (other) gold miners. Hence location more strongly influenced perceptions than the individual's particular job. Where occupation does make a difference we will refer to the particular occupational group.

Most gold miners in the sample were pit workers (72.7 %), who also represent the largest share of the mining population in general. We made special efforts to also interview mine operators or owners (N=9). It is important to understand their ideas because mine owners have most power to change labor conditions. Other gold miners in the sample were transport providers (5.5 %), cooks (3.1 %), technicians (1.6 %), and shop owners (1.6 %), among other occupations. Being a mine owner proves to be a rather volatile position. Of the 13 people who had started working as a mine operator, almost half (N=6) were working in the pit and one person was working as a guard at the time of the interview. Inversely, current mine operators had usually started out as pit workers, cooks, or other kinds of laborers. The Suriname and French Guiana gold mining populations are male-dominated, and this was reflected in the sample: only five individuals who worked in the mines were women (2.9 %).

Table II.2. Research population

| | Broko- pondo | Lawa | Tapana- honi | Nassau | Total |
|-----------------------------------|-----------------|------|-----------------|--------|-------|
| <i>N_{total}</i> | 118 | 202 | 125 | 151 | 596 |
| <i>Not a miner</i> | 95 | 148 | 74 | 106 | 423 |
| <i>Gold Miner</i> | 23 | 54 | 51 | 45 | 173 |
| <i>Men</i> | 69 | 84 | 75 | 93 | 321 |
| <i>Women</i> | 49 | 118 | 50 | 58 | 275 |
| <i>Average age</i> | 36.2 | 34.0 | 29.5 | 34.0 | 33.5 |
| <i>% Married or cohabitating</i> | 67.2 | 68.3 | 75.8 | 78.8 | 72.3 |
| <i>Average number of children</i> | 3.5 | 4.0 | 2.5 | 3.5 | 3.5 |
| <i>Education</i> | 6.9 | 3.2 | 4.1 | 5.11 | 4.6 |

People who did not work in the small-scale gold mining area did a variety of jobs. The majority of women were small-scale farmers, generally at a subsistence level (61.5 %). A smaller share of men (11.8 %) also named farming as their main economic activity. A third of men (32.6 %) earned income from the informal sale of goods and services, an activity called 'hosselen'. The main formal employer is the government, providing jobs to 8.5 % of women and 21.1 % of men in the study sample. A few women earned income through hosselen (2.7 %), were students (2.7 %), or were working at the Cambior plant (1.5 %). Relatively more men were employed with Cambior (5.7 %). Other men

performed wage labor elsewhere (5.7 %) or owned a store (5.3 %). A considerable number of women (16.8 %) and men (11.8 %) reported not to study or work for income. We suspect that this result may partly be a recording error, as some people may not list their subsistence activities when asked about the 'work' they do.

Survey respondents were on average 33.5 years of age and the majority (72.3 %) was married or cohabitating. The inhabitants of all regions had, on average, between 2.5 and 4 children. The average small-scale gold miner had significantly fewer children (N=2.5) than the average non-miners (N=3.9). This difference may be due to non-miners being, on average, five years older. As compared to non-mining community members, gold miners had enjoyed more years of formal education (5.5 years vs. 4.3 years). This difference is significant and can be explained by the low number of women in the sample of miners; girls are more likely than boys to leave school prematurely. Overall educational rates are low. Except for Maroons from Brokopondo, the average survey respondent had not finished elementary school. Across the complete sample only a third of women (34.4%) and half of men (54.9 %) had completed elementary education.

3. Data collection and analysis

In order to assess local perceptions of small-scale gold mining impacts we implemented a knowledge-awareness-perceptions survey. Prior to starting survey work, the research coordinators had discussed the study with village authorities. Local Maroon leaders from all villages gave permission to conduct the survey and assisted in finding housing and other logistical arrangements.

Nine research assistants conducted each approximately 75 surveys in one of the four study regions, during January-February 2004. Six out of nine research assistants were of Maroon descent and the one French assistant had lived for several months in a Ndyuka village along the Lawa river. The two remaining surveyors were fluent in the Suriname city Creole, Sranantongo, which is spoken by a large share of people in the interior. As a result none of the surveyors encountered language problems. They were generally well received, though some gold miners were initially suspicious of their intentions.

The survey contained eleven sections and is attached as Appendix A. We first asked the interviewee to provide basic demographic data such as age, marital status, and education. In the next section (B) we asked about access to public information and media. We wanted to know how often people received news from radio, TV, newspapers, and posters, and which of these media they preferred. Section C entitled 'Relation to mining' asked about the various ways in which the interviewee might obtain direct or indirect income from small-scale gold mining. Next we turned to positive (D) and negative (E-J) impacts of small-scale gold mining. In terms of negative impacts we inquired about the person's knowledge and perceptions about malaria (F); mercury contamination (G); water pollution and water-borne diseases (H); loss of respect for local authorities (I); and migration (J).

The survey contained additional sections for gold miners. These sections asked about occupational accidents (K), violence and criminality (L), and alternatives to gold mining (M). Mine owners also were given additional questions. These questions focused on economic management of the mining operation and mining methods, such as the use of retorts (mercury recycling devices). To conclude we asked the interviewee to reflect on actions that villagers, gold miners, and the government could take to abate gold mining pollution and improve health and safety in the mining areas (X).

Surveyors were given oral and written instructions on how to ask the questions. In some cases, we wanted to record the first spontaneously mentioned answer. This was the case in a question such as “What makes people fall ill with malaria?” In other cases we probed for more complete answers, yet without providing example answers. For example, following the above question we would ask: “Do you think [previous answer] is the only reason that people catch malaria? Do you think there are other causes for this disease?” In yet other cases, we would go through a list of items and ask the person which ones were applicable. We used this format to ask about malaria prevention strategies. In this case we first asked “What do you do reduce the chances that you will fall ill with malaria?” Next we would continue asking: “Do you sleep with mosquito netting?” “Do you drink any forest medicine to prevent malaria?” “Do you burn a mosquito candle?” and so forth.

Data were entered in Excel (Microsoft Office XP), cleaned, and converted to a format suitable for statistical analysis. The statistical software programs Excel and SPSS (version 11.5) were used for data analysis.

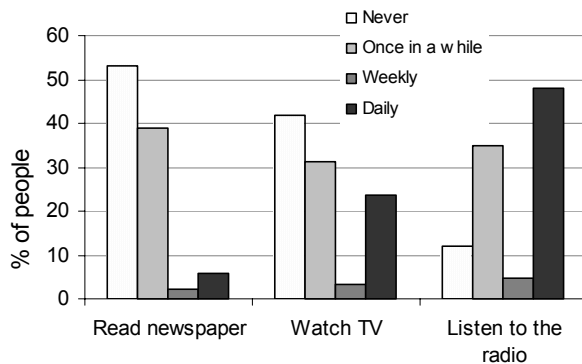
RESULTS

III. ACCESS TO NEWS AND INFORMATION

1. Media access

Maroons have a strong oral tradition. Traditional knowledge and current information about local affairs are typically spread by word of mouth. Interpersonal communication alone, however, fails to adequately inform Maroons about national and international events that increasingly impact their lives and subsistence strategies. News and information from outside are disseminated through newspapers, radio, television, and pamphlets. Yet access to these media is severely limited in most of the Suriname and French Guiana interior.

Figure III.1. Proportion of people obtaining information from newspapers, TV, and radio



None of the national newspapers is distributed in the interior. National television news and current affairs programs cannot be received in most of the interior, with the exception of Brokopondo. The owners of satellite dishes may watch the daily news at Brazilian television channels, but these devices are expensive. Satellite dishes are most common in the Lawa villages (Picture 1) and in small-scale gold mining camps. Where there is no access to broadcasting networks, television is used for playing videos and DVDs.

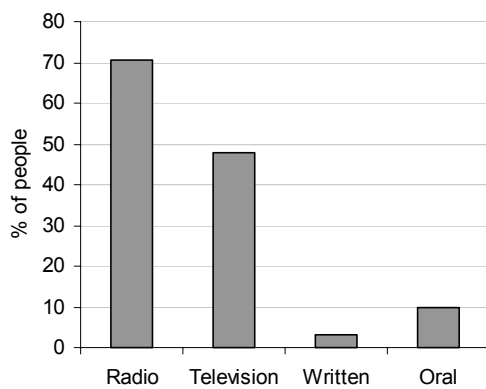
The distribution of televisions reflects differences in relative wealth and access to broadcasting stations. More than half of surveyed Maroons in the Lawa and Brokopondo regions owned a television (55.9 % and 58.5 %, respectively), while television ownership was rare in the relatively poorer communities along the Tapanahoni (10.4 % of residents) and Marowijne (31.3 %) Rivers. Televisions reach a considerable audience even in villages where few people possess one, because televisions are often displayed in a store or at other locations where people gather in the early evening hours.

Restrictions to media access limit the ways in which people receive news. Most respondents (53.1 %) never read the newspaper and a large share (41.9 %) never watched television (Figure III.1). Lawa Maroons were more likely than others to watch television; almost half (49.0 %) of interviewees from this region watched television daily, versus only 9.3 % in the other regions.

Picture I. Satellite installations at Grand Santi



Figure III.2. Preferred medium to receive information*



* Percentages add up to more than 100% because some people named more than one item

The only widely available media form is radio. Maroons in all villages and mining camps regularly listened to *Radio Pakati*. This Maroon radio station services Eastern Suriname and Western French Guiana and is the only news medium developed with and for Maroons in the interior. Radio ownership was distributed evenly across regions, with 72.3 % of Maroon interviewees owning a working radio. Almost half of respondents (48.1 %) reported listening to the radio daily and 40.2 % obtained radio information less frequently. There was virtually no difference between gold miners and community members not working in the mining areas in terms of how frequently they watched television, listened to the radio, and read the newspaper.

Public health information is often distributed in the form of posters that explain in text and images how to prevent malaria, dengue, HIV/AIDS, and other diseases (Picture 2). Our results suggest that posters reach a significant share of the target population but not everyone. Less than half of respondents (46.9 %) said they knew and completely understood the posters on the walls of the local clinic, school, or community building. Another quarter of people (24.0 %) partially understood the posters. The remaining people did not understand (17.4 %), did not know (6.9 %), or had not read (4.7 %) the posters.

Picture 2. Poster promoting safe sexual practices



Access also determines how people would like to receive information in the case an awareness and information campaign was to be brought to them (Figure III.2). Radio (named by 70.5% of respondents) and television (52.3 %) are the most popular media, while oral and written information (newspaper, posters) are less desired. The best moments of the day to broadcast radio or television programs is the late afternoon or early evening (Table III.1)

Table III. 1. Preferred moment of the day to listen to the radio or watch television

| Time | % of people |
|-----------------------------|-------------|
| Early morning (6-9 am) | 12.4 |
| Mid-morning (9 am- 12 noon) | 17.8 |
| Afternoon (12-3 pm) | 11.6 |
| Late afternoon (3-6 pm) | 32.6 |
| Evening (6-9pm) | 54.0 |

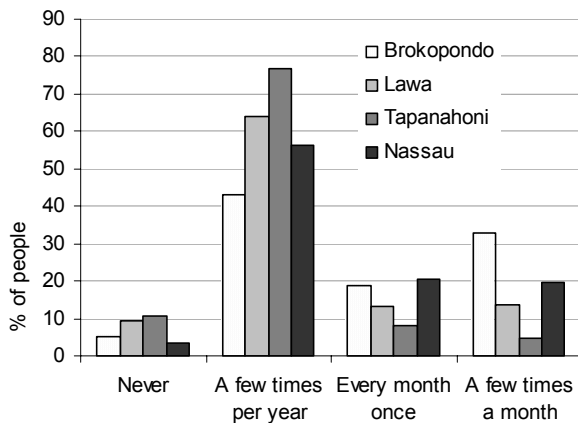
2. Literacy and language skills

Any information campaign in the interior must take into account that not everyone speaks and reads in the national languages. Less than a third of survey respondents reported fluency in Dutch (24.2 %) and/or French (6.8 %). Approximately a third of the sample population was illiterate (30.8 %) and another quarter (24.4%) reported possessing only modest reading and writing capabilities. In other words, less than half of Maroon respondents felt comfortable with written text. We asked the literate interviewees how much they would pay for a weekly magazine with local news. Most were willing to pay between US\$ 0.05-US\$ 0.39 (38.1 %) and between US\$ 0.40 – US\$ 2.00 (38.4 %). Few people (2.8 %) were willing to pay more than that.

Literacy and language skills are not distributed evenly across regions and genders. People from Koffiekamp and Balengsula (Brokopondo) scored best in terms of language skills and reading ability. Eighty-seven percent of Maroon individuals in these villages reported

complete or partial knowledge of the national language, Dutch. A similar share of people (88.1%) displayed at least some reading capacity. Maroons living in settlements along the Lawa River scored worst on language and literacy indicators. A significant share (43.6 %) of Maroon individuals in this area was mono-lingual in the Ndyuka language. Among the ones who did speak another language, numbers of Dutch and French speakers were similar. Men scored better than women on all educational indicators. More women (44.7 %) than men (18.4 %) were completely illiterate and fewer women (58.0 %) than men (81.1 %) could speak at least one of the national languages.

Figure III.3. Frequency of contact with the urban and coastal area.



Bars represent respondent's answers to the question: "How often do you travel to the city or coast?" The city or coast referred to Paramaribo, Cayenne, Albina, or St. Laurent

If news does not come to the interior, do people obtain information in the city? Figure III.3 suggests that this is rarely the case; even people from the villages closer to the urban area do not travel to the city regularly. People from the Tapanahoni region have least contact with the city; more than three-quarters of Maroon individuals from this region only visits the city a few times a year and another 10 % never leaves the area. In all regions women are less likely to travel than men; 78.8 % of women said to visit the city no more than a few times per year, versus 58.5 % of men

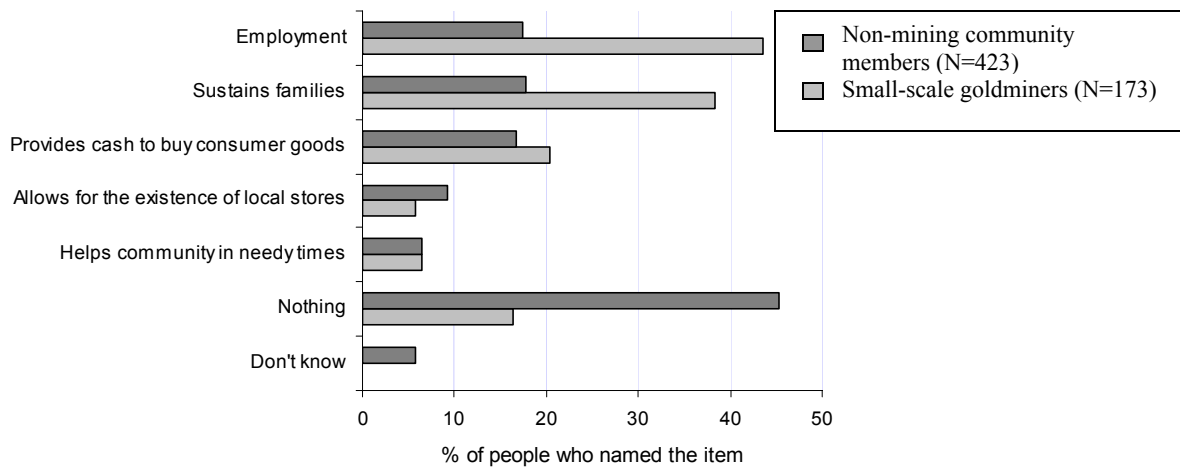
Poor access to national communication networks reinforces the isolation of the interior. Few forest communities have a public telephone or are within reach of the mobile telephone network. Suriname forest communities are further excluded from acquiring information by the absence of postal services. Whereas the French 'La Poste' weekly takes mail up and down the river, the Suriname postal services stop working at about 50 km land inward from the coast.

IV. POSITIVE EFFECTS

Small-scale gold mining sustains a large share of families in the interior. Hence providing employment and sustaining families were considered the most important benefits of gold mining (Figure IV.1). Mining not only allows for meeting families' basic needs but, in lucky times, also provides the cash to buy consumer goods. Desired goods such as motor boats, electronic appliances, and better built houses, make life more comfortable.

Figure IV.1 shows that gold miners themselves are more positive about the effects of mining than villagers who are not working in the mines. Nearly half of non-miners (45.3 %) were of the opinion that small-scale gold mining brought 'nothing' good. Sixteen percent of miners shared this opinion.

*Figure IV.1. Positive effects of small-scale gold mining according to miners and non-mining villagers**



**Percentages add up to more than 100 because some people named more than one item*

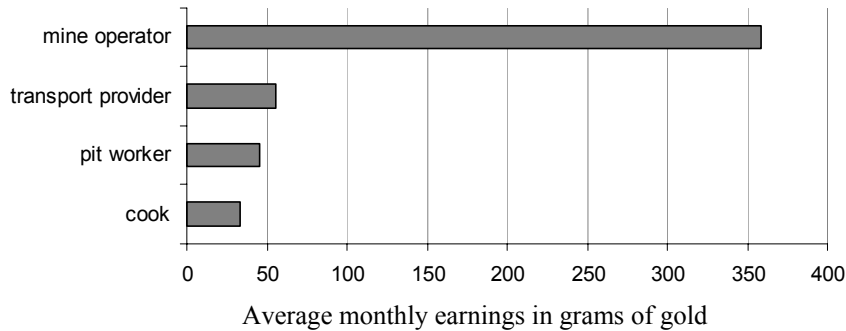
1. Direct and indirect income from mining

Estimating how much money small-scale gold miners actually earn is difficult for various reasons. Mining revenues are uncertain and change significantly from month to month. A miner may find less than 5 gram of gold one month, and go home with 50 gram a month later. Second, gold miners may not mine throughout the year. Some go for a month or two to the mining fields to supplement earnings from wage labor or farming, while others do not leave the mining area for more than 12 months in a row. Third, miners themselves may have many reasons to hide their real earnings, such as tax evasion and fear of being robbed. The fieldwork period was too short to establish the relationships of trust that are needed to obtain reliable income estimates. Nevertheless, based on our earlier research experience in small-scale gold mining areas we believe that the figures we present are fairly representative.

We asked gold miners how much gold they had earned from the last pit they had worked in and how much time it had taken to work this pit. We asked the same about the pit

before last. From these figures we calculated a monthly income. Excluding missing cases we obtained 232 observations of monthly revenues. Figure IV.2 displays the average monthly wages of different job categories in the small-scale gold mining industry. Ranked first with the highest income are the mine operators, who usually are the owners of the mining equipment, followed by transport providers, pit workers and cooks.

Figure IV.2 Distribution of revenues for the four main job categories in the small-scale gold mining industry.



Although the earnings of the mine operators seem relatively high compared to the other job categories, a large percentage is spent on the payment of different standard expenses. These expenses include costs like concession fees: 61.0 g/month, food for the mining crew: 71.3 g/month and diesel oil to work the machines: 36.8 g/month.

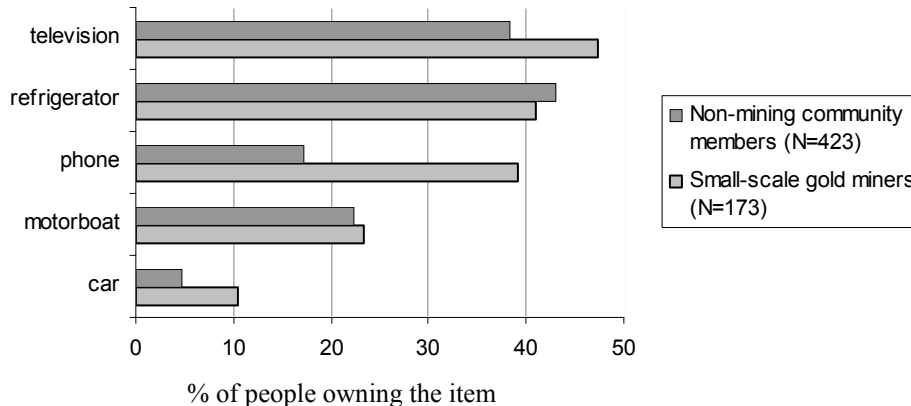
Picture3. Transport provider trying to get his ATV out of the mud



The question arises if the earnings made in the small-scale gold mining industry allow small-scale gold miners to accumulate more wealth than non-mining community members. A comparison between the groups in terms of their possession of consumer goods suggests that differences in wealth are small (*Figure IV.3*). Gold miners were more

likely than non-miners to possess televisions, phones and cars, while possession of the other consumer good categories (motorboats and refrigerators) was more or less evenly distributed.

Figure IV.3. Possession of consumer goods among miners and non-mining community members.



2. Contributions to community wellbeing

Mining not only sustains those working in the mining area. A fifth share of non-mining people lived in a household where at least one of the members was a gold miner (21.5 %). In addition, almost half (47.2 %) of community members received financial support from gold miners outside the domestic circle. A few others made money of the small-scale mining industry by selling food, snacks, or goods to transitory miners (5.6 %), working with miners (1.9 %), or owning a store that mainly catered to miners (1.5 %). These figures suggest that more than 80% of non-mining community members depends on small-scale gold mining for income.

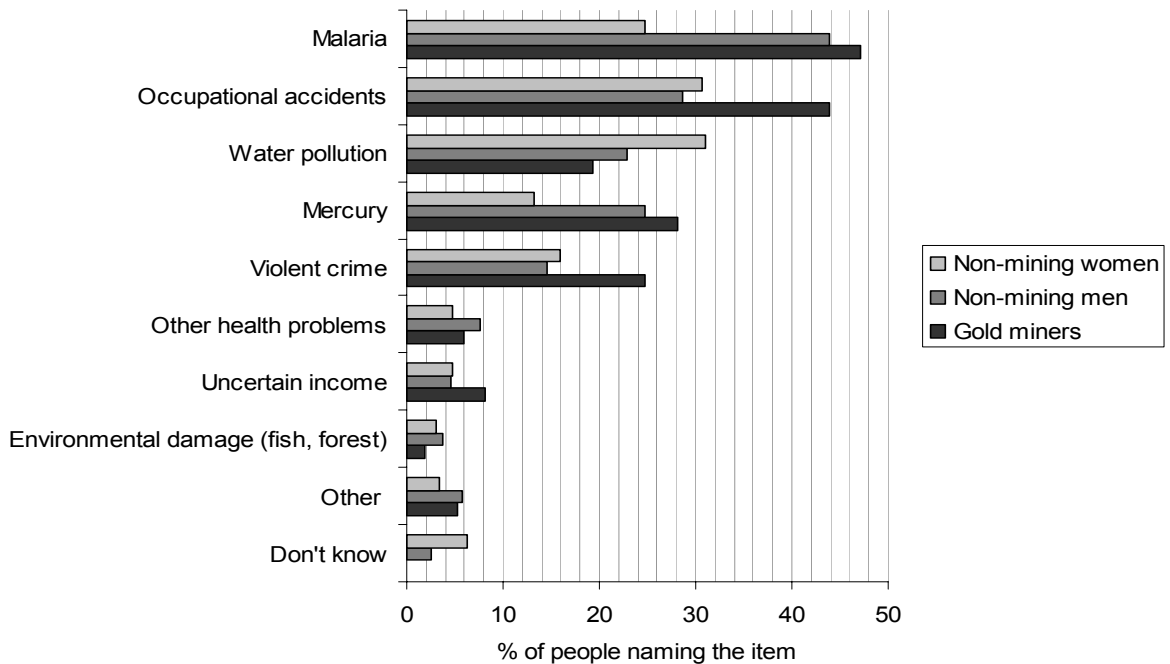
Even people who do not earn personal income from mining can benefit from the presence of miners in the community. Several people (6.4 %) mentioned that small-scale gold mining helped the community in various ways. They sponsor ceremonial events, give away food and small-presents, and fill gaps in community funding for public transport and electricity.

In many communities a special committee ('Vereniging') will collect voluntary contributions in times of need. We asked people how much they thought miners should monthly contribute this committee. Miners and non-miners had similar opinions about this. A third of people answered that miners themselves should decide. Others suggested monthly donations of 1-2 grams of gold (27.6 %), 3-5 grams of gold (17.6 %), more than 5 grams of gold (17.3 %), and 5-10% of mining revenues (3.8 %). Less than one percent of people thought that miners did not have to contribute anything. These responses reflect the idea that miners have a certain obligation to help the community overcome difficult times.

V. NEGATIVE EFFECTS

Gold miners and villagers generally agreed about what the most negative side-effects of small-scale gold mining were (Figure V.1). Malaria, occupational accidents, water pollution, and mercury are perceived to be the worst consequences of gold mining activities. Miners were more than non-mining community members concerned about occupational accidents and violent crime, which affect their health and safety in their every-day working lives. Maroon women, who are responsible for finding clean water to drink, cook, bath their children, and wash their clothes, are most severely affected by the sedimentation of rivers and creeks. Hence they displayed the greatest concern about water pollution. Impacts grouped under the title ‘other’ included: prostitution, boys leaving school early, broken families, alcoholism, Brazilians, mosquitoes, and a lust for money. The responses confirm our qualitative research results (Heemskerk and Oliveira 2003).

Figure V.1. Negative effects of small-scale gold mining in the opinion of gold miners (N=170) and male (N=156) and female (266) Maroon individuals not working in the mining areas.*



*Percentages add up to more than 100% because some people named more than one effect. The graph displays answers mentioned by at least 3% of the total survey population.

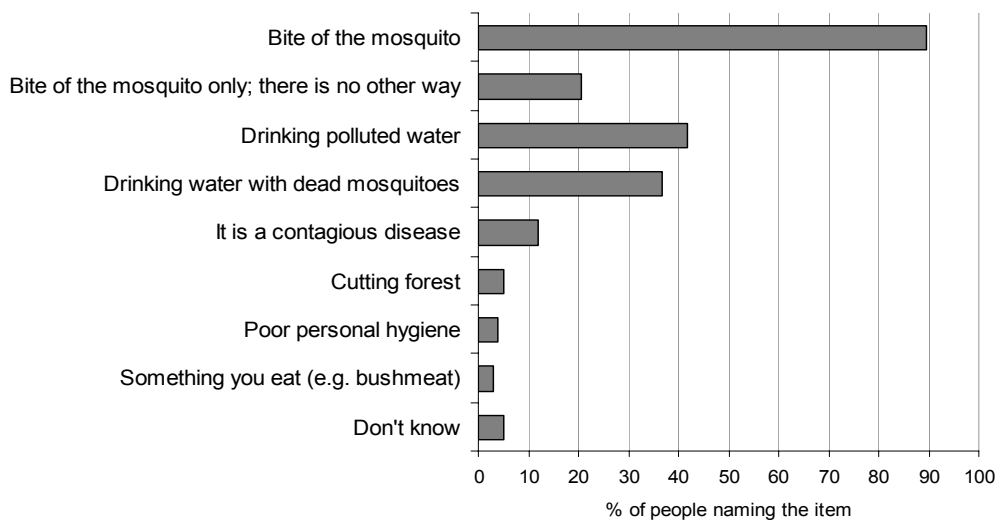
VI. MALARIA

Malaria is among the main threats to public health in the Suriname and French Guiana interior. Small-scale gold mining has promoted the spread and development of this disease by leaving pits with standing water, which form breeding grounds for the malaria mosquito. We found little difference in the number of times that small-scale gold miners and non-mining community members had been ill with malaria over their lifetime. Fewer gold-miners (6.4 %) than non-mining community members (14.8 %) said they had never been ill with malaria. Conversely, gold miners (43.3 %) were relatively more likely than others (37.4 %) to report more than 10 incidences of malaria. Yet between 14 % and 18% of people in both groups fell in each of the remaining categories: 1-2 times malaria, 3-5 times malaria, and 5-10 times malaria.

Regional differences were more profound. Maroons living and working in Brokopondo were least exposed to malaria; about a third of interviewees from this area had never had malaria and 44 % had been ill with this disease only once or twice. Most worrisome is the situation along the Lawa and Tapanahoni Rivers, where approximately half of the population reported more than 10 incidences of malaria over a lifetime (55.7 % and 49.2%, respectively).

There are no signs that the disease is being eradicated. On the contrary, a quarter of people with a malaria-history said they had had malaria in the month prior to the interview³. Another quarter had been ill with malaria no longer than a year ago. Research suggests that a high prevalence of malaria not only threatens the well-being of Maroons today, but also will impede long-term socioeconomic development (Sachs and Malany 2002).

Figure VI.1. Causes of getting malaria according to Maroon respondents (N=594)*



*Percentages add up to more than 100% because some people named more than one cause. The figure excludes a variety of perceived causes mentioned by less than 3 % of the research population. These causes were diverse and included bacteria, humanity's sins, and too much bathing in the river.

³ Survey interviews were conducted in January-February 2004

Almost everyone (89.5 %) knew that malaria is transmitted by the malaria mosquito. Less than a quarter of these people, however, knew that the mosquito bite is the only cause for falling ill with malaria. The most common misperception is that one contracts malaria from drinking polluted water or water with dead mosquitoes or mosquito eggs (Figure VI.1). Other erroneous ideas, such as that one gets malaria from eating certain foods or having poor personal hygiene, are less widespread.

To prevent malaria, most people are sleeping with mosquito netting (83.3 %). Some Maroons also rely on the extracts of plant leaves, roots, or bark, which they drink as a tea (18.1 %) or use to bath in (2.9 %).

Picture 4. Local Maroon preparing leaves to make a medicinal bath



Appendix B lists the plants that were used as forest medicine to either prevent or cure malaria. Others had visited a Western doctor to obtain quinine (4.5 %). Strategies to either kill or chase away mosquitoes included burning a mosquito candle or Vape (9.0 %), spraying with insecticide (e.g. Baygon, 2.9 %), and applying mosquito gel or spray (1.0 %). A variety of other methods people applied to prevent or cure malaria included drinking rum or boiled beer –both with or without salt-, relying on God, and covering exposed skin with clothing.

VII. OCCUPATIONAL SAFETY

1. Accidents and other health problems

Small-scale gold mining is a hazardous occupation. Safety measures and gear, such as helmets and protective glasses, are usually absent. Moreover, inexperienced novices seldom receive adequate training prior to working with dangerous machinery. Accidents are the result, causing injuries and mortalities. A considerable number of gold miners (37.5 %) had had an accident on the workplace. A third of these accidents (35.1 %) had been caused by the water hose leaping out of one's hand. Others reported having been hit by a falling branch or tree (12.5 %); having crashed with an All Terrain Vehicle (8.3 %);

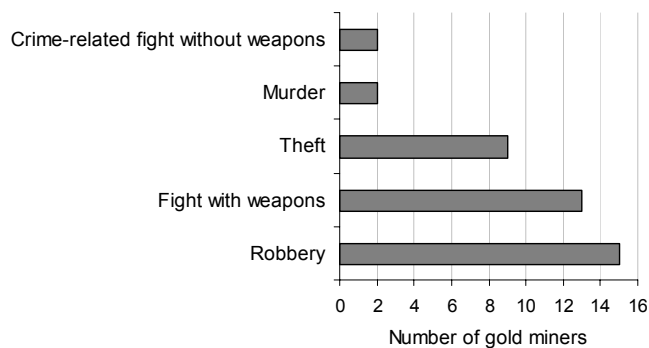
having had an accident with machinery (6.3 %); or having been buried when a pit caved in (4.2 %).

Picture 5. Pit worker using all his force to control water hose



Most miners came away from these accidents with no more than cuts (25.5 %) and bruises (15.7 %). Several gold miners, however, had been hurt more seriously. They reported broken limbs (19.6 % of those in an accident), the loss of body parts such as finger tips (9.8 %), unconsciousness (5.9 %), and a variety of other injuries. One person was left disabled. In addition, most gold miners (89.5 %) experienced a variety of other job-related health problems. Most common were back-aches (65.9 %), skin irritations (41.5 %), swollen feet (27.5 %), and sores (13 %). One mining boss reported a death in his camp.

Figure VII.1: Violent crime experienced by survey respondents working in the mining area



Hazards are not produced by work methods and machines alone. Criminals form another risk. A quarter of respondents (N=31) had been a victim of violence or crime (Figure VII.1). In most cases it concerned a robbery or a duel, usually with guns. Two gold miners had witnessed the murder of a fellow worker. The lack of security makes that many miners carry a hunting rifle (43 %), a hand gun (7.3 %), a knife (11.4 %) or a machete (8.1 %) for self-defense

2. Treatment and insurance

More than half of gold miners did not visit a doctor when they experienced health problems. They either did nothing (7.8 %) or else relied on self treatment or the help of friends (49.1 %). Popular remedies in self medication were different types of oils and balsams such as baby oil, Vaseline, Krapa oil, coconut oil, and a balsam sold under the name Nixoderm. Others used antibiotics and other medicines bought in the city or from Brazilians. Four out of nine mine operators had a medical kit in their camps. The typical kit contained pain killers, disinfectants, antibiotics, band-aid and bandage, and a malaria cure. Among those who consulted a doctor (N=52), most went to the closest doctor (80.8 %). A smaller proportion of miners traveled all the way to town to see a doctor (17.3 %) and one person said he relied on the help of a traditional healer.

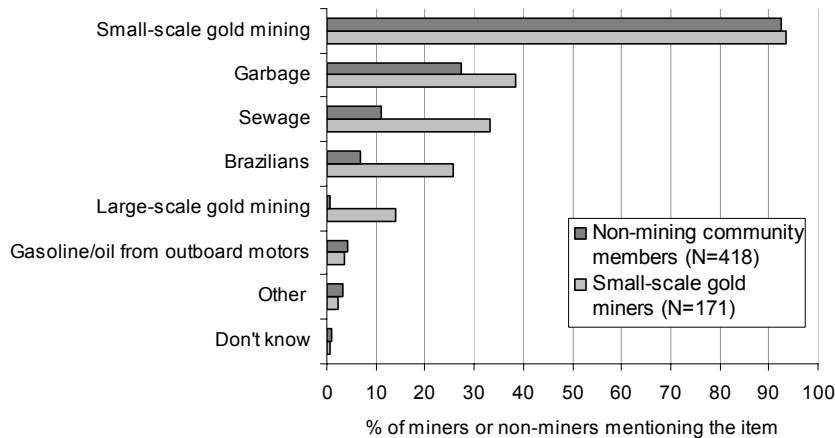
Given the deplorable health conditions in the mines, it is alarming that 41 % of surveyed miners did not have any form of health insurance. Most insured miners possessed a doctor's card from the public social security services. This card provides access to free or low-cost medical treatment in a forest clinic (36.2 % of total sample of miners), the city (18.1 %), or both (3.9 %). One gold miner had private health insurance.

VIII. WATER POLLUTION

Water pollution featured in the top three of worst consequences of the gold rush in all study areas. The tailings of small-scale gold mining operations are making rivers and creeks murkier. River water that used to be potable no longer is suitable for human consumption. In some locations even cooking and washing has become a problem, and some creeks disappear altogether in the dry season. Turbidity also interferes with the fish stock. Research in Suriname suggests that streams affected by small-scale gold mining activity have lower species diversity, a lower proportion of young fish, and a low relative biomass of food fishes (Mol and Ouboter 2004).

Small-scale gold mining is not the only threat to the aquatic ecosystem, but nevertheless mostly to blame for the water problems communities are experiencing. Equal shares of gold miners (93.6%) and non-mining community members (92.6%) shared this opinion (Figure VIII.1). Garbage and sewage were perceived as the next most important causes of water pollution. Only two villages had a provisionary sewage system and none had a waste disposal system. Garbage is usually thrown on piles in the village to be burned, or else tossed straight into the river. The absence of an adequate plan to process garbage is an increasing problem as people are using more plastics, tins, and other inorganic materials. Other people blamed Brazilians (12.2 %), large-scale mining (4.6 %), and boat motors (4.1 %) for polluting the rivers. Other factors included animal manure, mercury, people dying in the water, and the fact that "the world has become evil".

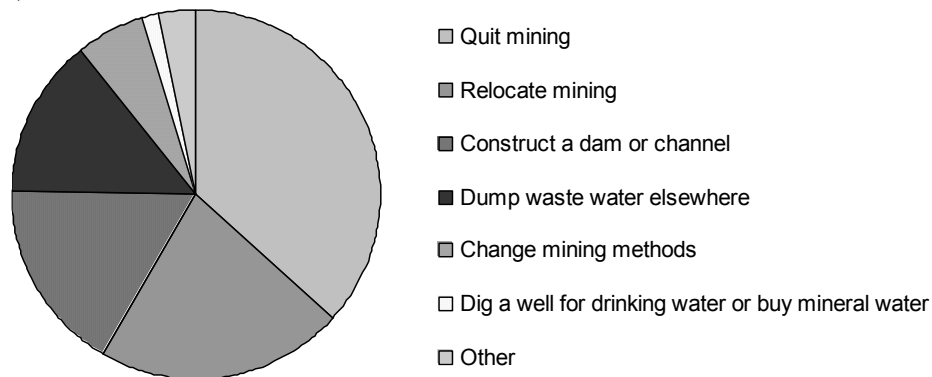
Figure VIII.1. Perceived causes of water pollution



Diarrhea headed the list of pains and illnesses that were associated with drinking polluted water (mentioned by 85.7 % of people). Other health problems that were thought to be the result of drinking polluted water included stomach pains (26.9 %), malaria (14.9 %), vomiting (2.2 %) and mercury poisoning (1 %).

When we asked people what to do about the water problem, almost half of people – mostly community members- said they did not know. Another 15 % thought that nothing could be done. The graph displays the answers of the people who did have an opinion about this issue (N=260). Stopping small-scale mining was the most frequently suggested solution to solve the water problem. Many other people offered ideas to prevent mine tailing from flowing into creeks and rivers. Miners could, for example, relocate mining activities (21.9 %), construct a dam or a channel (16.9 %), or dump waste water somewhere else, for example in an abandoned mining pit or a put constructed for that purpose (13.8 %). One person suggested taking a course with the Canadian large-scale mining operation about waste water treatment.

Figure VIII.2. Suggested solutions to abate water pollution from small-scale gold mining (N=260)

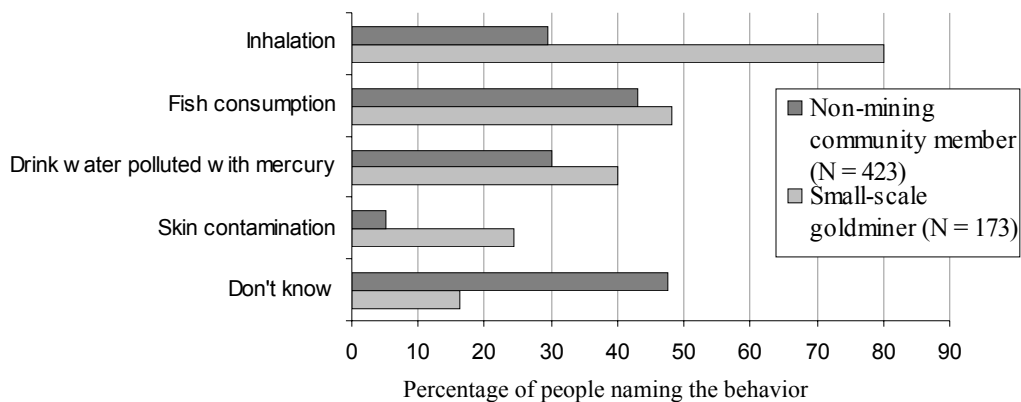


IX. MERCURY

Even though its effects are not yet clearly visible, mercury contamination poses a serious threat to the health of today's and future Maroon populations. This general fact is understood: mercury pollution ranks high on the list of negative impacts of small-scale gold mining. However, neither gold miners nor community member know enough about the risks this chemical poses to their health.

We asked respondents what behaviors place one at risk of mercury poisoning. Miners proved relatively better informed. Close to half (47.6%) of non-mining community members could not answer the question, versus 16.3% of gold miners. A large percentage of the gold miners (80.2%) knew that the mercury vapor that develops as a result of burning the mercury-gold amalgam is hazardous. A third of villagers (29.5%) also knew this. Forty-eight percent of gold miners and 43.0% of villagers knew that the consumption of polluted fish also posed a health risk. The remaining miners (24.4%) and villagers (5.1%) believed that skin contact with the chemical was dangerous and that one could get sick from drinking water that was polluted with mercury (miners 40.1% and non-mining community members 30.2%). Figure IX.1 summarizes these perceptions.

Figure IX.1. Behaviors that are believed to place one at risk of mercury pollution



**Percentages add up to more than 100% because most people named more than one behavior*

The fact that nearly half of the people knew that mercury intoxication is possible through the consumption of fish is interesting, because fish forms a critical part of the local diet. More than half of interviewees reported eating fish daily (30.5 %) or at least a few times per week (27.1 %). Nine percent of people ate fish only a few times a month, and 31.2% reported infrequent fish consumption. Only 2.2 % of the people interviewed never had fish on their menu.

Even though people are aware that eating fish may jeopardize their health, they do not know what kinds of fish and which part of the fishes contain most mercury. Only 1% of all people interviewed knew that mercury attains its highest concentration in the tissues of fish at the top of the aquatic food chain: carnivorous fish. Two-thirds of people (62.6 %) said they could not say what fish species might contain higher mercury levels. The

remaining 36.4% named several different kinds of fish (e.g. smooth-skinned fish, swamp fish) and more than 30 different species of fish. Among these species were popular food fishes such as: anjumara (*Hoplias aimara*), patakka (*Hoplias malabaricus*), tukunari (*Cichla ocellaris*) and pireng (*Serrasalmus*)³. No-one knew that mercury accumulates in the fish liver. Seventy percent said they did not know what part of the fish contained most mercury, and the remaining respondents gave wrong answers.

Picture 5. Local Maroon proudly showing his catch for the day



When asked what happened with the mercury after it entered the body, again many people replied that they did not know (44.6 %). A third of respondents answered, correctly, that mercury stays in the body for a long time (34.7 %). Interviewees from the Lawa region (47.3%), followed by the Nassau population (19.3%), were most likely to know the right answer. A significant share of others thought the body would lose mercury with defecation (12.1%). The remaining 8.6% of the interviewees mentioned other possibilities such as: it can be removed by a doctor or by Western or traditional medicine, or it leaves the body another way.

More than three quarters of people could not name the symptoms of mercury infection (79.3%). People who did respond either said that the signs were not visible (7.1%), or stated other signs such as: the person grows thin or fat, feels nauseous, walks unstable, and gets grey hair.

The fact that Lawa Maroons knew more about mercury than Maroons from other areas can be attributed to field visits to this river by French mercury researchers. Of the 13.8% of interviewees who had been in contact with a mercury research team, 70.7% lived along the Lawa.

³ Latin names provided by Jan Mol

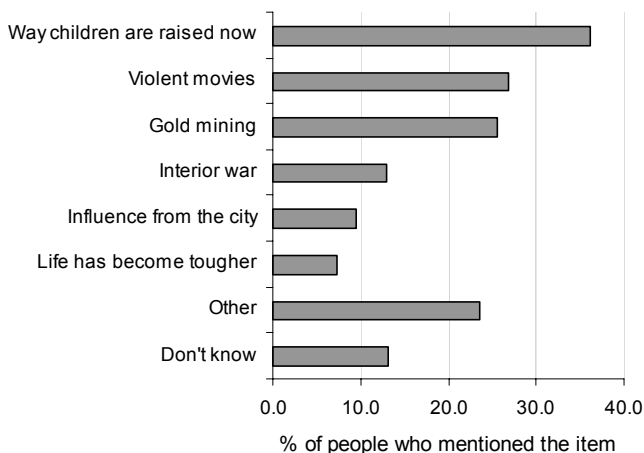
When the mine operators were asked if they used retorts to reduce the risk of inhalation of the mercury vapor the responses were disappointing. Only two out of nine used this device in the burning process. Five of the respondents tried to reduce inhalation risks by covering up their noses and mouths and one respondent said to keep a safe distance during the burning process. The mine operators that did not make use of a retort stated that this was the case because they had never actually thought about purchasing it, although they knew about its existence.

X. RESPECT FOR VILLAGE ELDERS

Some people believe that respect for traditional authorities is being affected by small-scale gold mining. They point out that young men with much money want to live ‘big’ and no longer feel it is necessary to listen to elderly. Moreover, changes in mining techniques make traditional mining knowledge less relevant for youngsters.

We asked Maroon individuals if they believed that today’s youth respected others, particularly elderly, like they did in the olden days. A large majority of people (87.8 %) was of the opinion that respect had been lost. Only a quarter of these people, however, believed that small-scale gold mining was the (main) culprit (Figure X.1). The way children are raised and violent movies were felt to be the most important sources of disrespect. The category ‘other’ groups a wide variety of additional reasons that were mentioned, including: drugs/alcohol use; children leave school early to start working; ‘the coming of the end of the world according to the bible’, and ‘the type of milk children are drinking now’.

Figure X.1. Perceived causes for the lack of respect (N=504)*



* Percentages add up to more than 100 because some people named more than one reason

XI. BRAZILIAN MIGRATION

A large majority – some estimate 75% - of small-scale gold miners working in Suriname and French Guiana are Brazilian miners, called ‘garimpeiros’. The arrival of large numbers of foreigners to the Suriname and French Guiana interior has not gone unnoticed by the local population. In mining areas, Maroons and garimpeiros may work on the same team or in neighboring camps. Communities tend to see Brazilians only on the weekly day off, when they come to look for groceries, women, and entertainment. Language barriers and cultural differences make that interactions between Maroons and Brazilians tend to remain distant and in some cases even hostile.

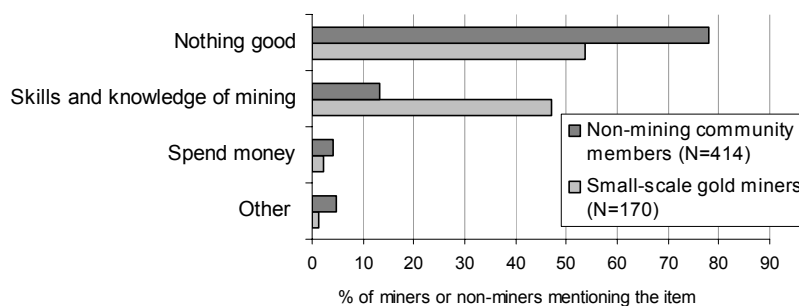
1. Positive impacts

Brazilians are not very popular with local Maroons, and less so among non-mining community members. When asked about the good things that Brazilians had brought to the region, a common first reaction was ‘Brazilians? They have brought nothing good!!’ Fifty-four percent of gold miners and 78 % of non-mining community members said they saw no single benefit in the arrival of garimpeiros (Figure XI.1).

At the same time, Maroon gold miners acknowledged that they themselves had brought the Brazilians to their work sites. They value Brazilians for their mining skills and work ethic; they work long hours, they work hard, and they work efficiently. As compared to local miners, Brazilians also tend to squander a greater share of their earnings on local sales-men and women. Their spending-behavior was appreciated by 3.6 % of the surveyed population. Positive effects mentioned by other Maroons included TV news/satellite, cooperation in work, and development of the interior.

Eight respondents positively judged the fact that Brazilian men had begotten children with local women. Five interviewees thought this was a negative factor.

Figure XI.1. Perceived positive impacts of Brazilian migration

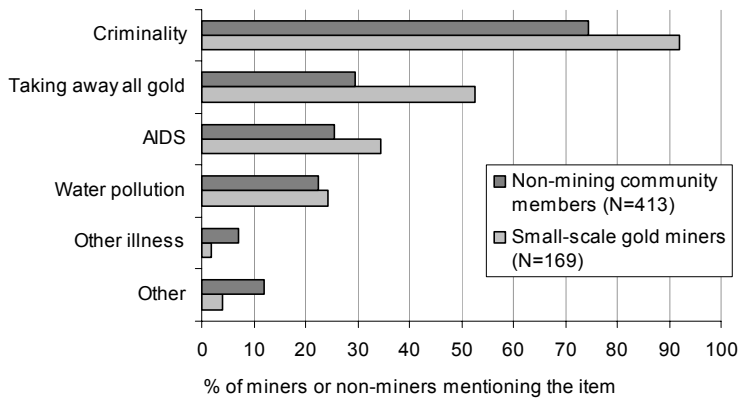


**Only answers named by more than 3% of the study population are listed*

2. Negative impacts

Gold miners and non-mining community members generally described Brazilian migration in negative terms. Crimes, in particular killings and robberies, were of greatest concern to respondents in all areas (Figure XI.2). Even though many honest, hard-working Brazilians have come to Suriname, this concern is not without grounding; informal observations suggest that the largest share of mining-related crimes is conducted by Brazilians. Reliable statistics on crime in the mining area, however, do not exist.

Figure XI.2. Perceived negative impacts of Brazilian migration*



*Only answers named by more than 3% of the study population are listed

Where, on the one hand, Brazilians mining skills are viewed as a positive asset, these skills also make that Brazilian miners take home the lions share of gold production. More than a third of respondents (36.3 %) complained that garimpeiros took away all gold. Brazilians also were held responsible for the spread of HIV/AIDS (28.1 %) and other diseases (5.5 %). Among the various other diseases that were blamed on Brazilians were cholera, more serious forms of malaria, ‘strange’ diseases, and cancer.

XII. SOLUTIONS

Working towards more sustainable livelihoods in small-scale mining communities requires that we go beyond listing problems and begin to think about solutions. Solutions also provide an alternative view on what people perceive to be the most pressing problems. We asked people what they thought the government, local communities, and gold miners themselves could do to mitigate the negative impacts of mining while strengthening its positive contributions. These questions elicited a wide variety of multifaceted responses that are discussed below.

1. The government

A considerable share of people said they either did not know what the government could do, or that the government itself would have to think up something. Referring to the repetitive failures to remove illegal Brazilian (and local) miners, others thought that nothing could be done.

Suggestions for government interference fell mostly into two broad categories, reflecting the areas of most local concern; health and criminality. Respondents who were concerned with crime mostly asked for the installation of police and military posts or security guards in the interior. A few people suggested training local people as police officers or a security force. Many Maroons wanted the government to take tougher action against criminals and other violators of the law. They advocated regulation of the sector, the registration of miners, and the provision and control of work permits for foreign miners. Special reference was made to garimpeiros, arguing that they commit most crimes. Some suggested removing Brazilians all together. Only a few people thought that talking with Brazilians could help.

In terms of health, concern about malaria motivated most requests for government assistance. More than a third of interview respondents named malaria control as one of the areas that demanded immediate public attention. People asked for spraying campaigns, free malaria medicine, mosquito nettings, and more research on this disease. Health concerns also motivated demands for more and better supplied clinics and doctors in the interior in general, and in mining areas in particular.

Alternative employment and improved educational facilities were perceived to be critical to expanding the range of livelihood options in the interior. Some people suggested banning small-scale gold mining altogether, but most interviewees did not consider this an option. Instead they advocated government support in organizing miners in associations, providing mining-related information and education, persuading miners to exploit their activities elsewhere, and developing different mining methods. Only two miners mentioned the need for mercury-free mining methods. One person proposed that the government take over the gold mining industry so that local people could become wage laborers for this state mining firm.

2. Communities

We asked what actions forest communities should or could take to abate the negative impacts of small-scale gold mining. The answers to this question varied. Most respondents agreed that local authorities should hold meetings with gold miners and the national government to come to permanent solutions. These solutions could be: banning small-scale gold mining, prohibiting Brazilian miners to work, and establishing armed security forces to enforce compliance with the national law. A small part of the sample population found that nothing could be done to improve the current situation because their own people worked in the small-scale gold mining industry. Moreover, they argued, there are no other jobs around for the men to support their families.

3. Gold miners

What can gold miners do? Many people said they did not know how miners could make things better, or believed that they could not do anything to improve working and living conditions in and around the gold fields. Several miners said they did not have the money to do something. Others saw the lack of unity among miners as a barrier to improvement.

Presented ideas centered on giving money to the village and self-organization, or a combination of the two. Several community members complained that gold miners were only thinking about themselves. They and others suggested various ways in which gold miners should contribute financially to community development. People typically envisioned that miners would donate a certain share of their revenues to a community development fund. Such a fund could help the community in needy times, but also support the school and the clinic, finance a housing project, and buy a village generator or water tower, among other things. One person thought such a fund should help socially disadvantaged groups in the village. On a larger scale, several people thought miners should pay taxes in order to contribute to regional and national development.

Another popular idea was for small-scale gold miners to unite. A miners' cooperation, association, or other form of organization could support community development projects and create employment by sponsoring micro-entrepreneurs in agriculture, cattle ranching, and the timber industry. A few respondents did not support this idea; they were of the opinion that everyone should fight his own battles. Gold miners, they said, should buy things for themselves and their families, such as consumer electronics, a generator, a large house, or a luxury car.

A few individuals offered solutions in other directions. Their ideas included to remove Brazilians, stop water pollution, or quit mining altogether. Several gold miners argued for better safety arrangements on the work floor, including the provision and use of protective gear. In this regard, one mining boss suggested placing an exhaust pipe at the mining machines to decrease noise and fumes. No-one referred to actions mines could take to reduce the use and spillage of mercury. The limited attention paid to this issue suggests that mercury pollution abatement is not among the top-ranking priorities among either Maroon gold miners or non-mining community members.

4. Large-scale mining: a viable alternative?

In national discussions about natural resources development, the large-scale gold mining industry is featured as an (preferred) alternative to the small-scale gold mining sector. The argument is that large-scale companies are –theoretically- easier to control, tax, and hold accountable for social and environmental mining impacts.

We asked small-scale gold miners for their opinions about working with a large-scale mining company such as Cambior or Suralco. Gold miners expressed mixed feelings. The most attractive features of a labor contract with such a company were health insurance and other social benefits (37.7 %), followed by a regular and stable income (25.2 %). A

large company would pay every month and on time. Financial security would allow one to save for larger purchases (4.6 %) and to take out loans (4.0 %). Other perceived benefits were in the safer (4.6 %; including no contact with mercury) and less strenuous (6.6 %) working conditions.

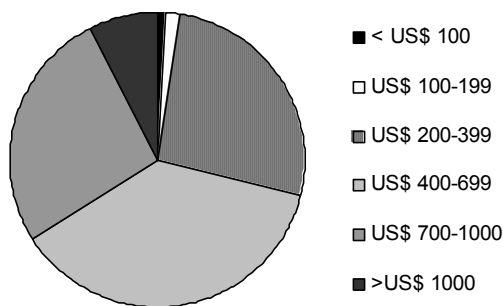
Miners also had their doubts about working with the larger mining enterprises. For one, they expected salaries to be lower than what they were earning in the gold fields. This salary would be further reduced by tax payment, and received in a currency that might lose its value. Others argued that wage laborers in large firms have to work their entire life without rest. A small-scale miner, by contrast, has a chance to be lucky and find enough to take a break. A related argument was that wage laborers cannot take leave as desired. Other disadvantages of working with a large-scale mining company were the strict supervision and occupational accidents.

5. Alternative employment

The need for alternative employment came up various times in discussions about solutions to problems in the small-scale gold mining sector. We asked gold miners what jobs they would accept in the hypothetical case that it would pay the same wage as small-scale gold mining. Work with one of the large scale mining companies was the most popular alternative to small-scale gold mining (52.5 %). Next on the list were a government job in the forest (32.2 %) and wage labor in the private sector (28.1 %). Fewer people preferred work in the timber industry or in the informal sector. Only three miners said they would not consider taking any other job.

The main reason for people not to take alternative employment is that other jobs pay less. We asked miners how much another job would have to pay for them to consider leaving the small-scale gold mining sector (Figure XII.1).

Figure XII.1. How much would an alternative job have to pay before miners would consider leaving the small-scale gold mining industry? (N=118)



Few people were willing to leave the small-scale gold mining industry for monthly wages under US\$ 200. This is about twice the minimum wage, but not an unreasonable demand considering the high prices for housing in Paramaribo. The largest group of respondents (37.3 %) considered trading mining for another job for wages between US\$ 400 and US\$ 700. About a quarter would take US\$ 200-400 to give up mining, and another quarter would quit for US\$ 700-1000. Given their on average low educational achievement, it is unlikely that many Maroons will find jobs in these higher wage categories.

CONCLUSIONS AND RECOMMENDATIONS

XIII. CONCLUSIONS

We began this report by stating three questions. In this concluding section, we will synthesize what answers the results provide to these questions.

- 1) *What do gold miners and non-mining members of affected communities know, and what critical information is lacking, about the impacts of small-scale gold mining?*

Small-scale gold miners and non-mining Maroons acknowledged that gold mining has two opposing sides. While sustaining many families in the forest, mining also produces health, social, and environmental problems. Of most concern were malaria, occupational accidents, water pollution, and mercury contamination. Despite awareness of the existence of these problems and their relation to gold mining, people were poorly informed about precise causes, symptoms, and possible remedies. In the case of malaria, for example, most people knew that a bite from the malaria mosquito caused one to fall ill with this disease. Yet many erroneous ideas about the causes of this disease existed in parallel. The causes and effects of water pollution and occupational accidents were well-understood, but people were poorly informed about changes in mining methods that could avert these problems.

Mercury pollution remains a mystery, though gold miners were slightly better informed than non-mining community members. Most people understood that different venues of contact with mercury constitute a risk to human health, including the inhalation of mercury vapor and fish consumption. However, few people could mention all risk behaviors. Moreover, the majority of people did not know what fish and what part of the fish accumulated most mercury. Neither could they tell the effects and symptoms of mercury intoxication. Lawa Maroons, who have had relatively more contact with mercury researchers, proved best informed about mercury contamination.

- 2) *What benefits does this mining sub-sector bring to gold miners, their families, and communities surrounding mining areas?*

Small-scale gold mining provides employment and income. Gold mining not only allows its workers to feed their families and buy consumer goods. It also is a source of cash income for about 80 % of non-mining community members in the survey sample. In addition, mining helps communities cope in difficult times. Miners may buy gasoline for the village generator, they finance funeral and remembrance ceremonies, and sponsor other village activities and resources.

3) *What opinions and ideas do local stakeholders have about strategies to remedy problems in the small-scale gold mining industry?*

Maroon respondents named a variety of actions that the government, communities, and small-scale gold miners could take to improve working conditions in small-scale mines, as well as health and well-being in communities surrounding mines. Conspicuous is the widespread demand for greater government involvement in the interior, particularly in the areas of health (malaria) and crime. Placing police and military posts in the interior, regulation and control of the mining sector, fighting malaria, and elevating the quality of education and health care services are among the many requested public policies. These requests indicate a break with the recent past when Maroon societies strived to minimize government interference in their social and legal affairs. Many Maroons were of the opinion that miners themselves have an obligation to (financially) help the community. Nevertheless, problems in the small-scale mining sector have grown out of control of local miners and authorities, and the need for more centralized, national level policy initiatives has developed over time.

In terms of reducing the impact of mining on the aquatic ecosystem, several suitable solutions were suggested. These solutions included dumping waste water into old mining pits or channeling the muddy tailings away from the rivers and creeks. However, few miners were actually using these methods. Similarly, concern about accidents on the mining work place did not lead people to use safety measures or gear such as helmets. Possibilities to win gold without or with less mercury were poorly understood, and the use of retorts rare.

A general observation from our analysis of local solutions is that suggested actions typically focused on the problem symptoms rather than on the root causes. To deal with malaria, the actions that were most referred to were spraying houses and providing free malaria medicine and mosquito netting. Fighting malaria in a more sustainable way, however, may benefit more from changes in mining methods. That is, if small-scale gold miners would fill in their mining pits the malaria mosquito would have less opportunity to spread. The limited number of suggested solutions that addresses root causes suggests that information and awareness about solutions is most direly needed.

XIV. RECOMMENDATIONS FOR AN INFORMATION CAMPAIGN

1. How to disseminate information

- The most important limiting factor in disseminating information to the interior is access: many media and communication forms are not available or function poorly in the interior.
- Community radio is the most accessible and popular medium to receive information. Campaign makers should work in close cooperation with local radio makers.

- Television is a popular medium, but most places in the interior have poor access to national broadcasting. Therefore, if TV is chosen as a medium to disseminate information, it should happen through the distribution of a video documentary. A large screen in the center of the village or mining camp is likely to attract a large audience.
- The best moments of the day to broadcast radio or television programs are the late afternoon or early evening.
- Limited literacy and language skills reduce access to written information and information brought in the national languages. If posters or cartoon brochures are used, pictures rather than words should convey the message.
- Children are the key to preventing and resolving problems in the future. Make information and awareness materials part of the elementary school curriculum.
- Involve Maroons in the design, implementation, and evaluation of an information and awareness campaign. An example is a poster-making workshop, with prizes for the best product. In addition to responding better to the target population, the dissemination of a local product can invoke a sense of ownership and empowerment. The Maroon radio station Radio Pakati is excellent example.

2. Information for whom?

- Mining-related social, health, and environmental problems are found throughout the interior. Their root causes, however, lay in the mines. Hence addressing gold mining problems should start there. Relatively small changes in the working and social behavior of small-scale gold miners have the potential to significantly reduce negative mining impacts.
- Mine bosses have most power to affect decisions about small-scale gold mining methods and tools. They are responsible for the use of retorts, the presence of safety gear, and the disposal of mining waste water. We recommend workshops on cleaner mining methods with and for this group.
- Improved information may help non-mining community members reduce their exposure to health risks. As the (extended) family members and neighbors of miners, community members also may be able to negotiate or pressure for socially and environmentally more responsible mining behavior.
- Women are disadvantaged in their access to information. As compared to men, they are less likely to speak the national languages, read, have finished elementary school, and travel to the city. Gender inequality in access to these and other resources shape the ways in which women receive and act on information. In addition, their specific daily life responsibilities make that women have a different

ranking of concerns. Gender differences make it worthwhile to target women separately.

- Mitigation of problems in the small-scale gold mining sector asks for greater government involvement. It cannot hurt to bring the local requests for public assistance to the attention of the Suriname and French Guiana governments.

3. What information is most critically needed?

- Most critical are information and tools that address the root causes of negative impacts. This includes information about reducing habitat for the malaria mosquito; about waste-water treatment; and about reducing or eliminating mercury usage, among other factors.
- Changes in the root causes will take a long time to materialize. In the short run, local populations can benefit from information that helps them cope with problem symptoms. This includes information on malaria prevention in the village, personal protection against mercury fumes, and reduction of mercury intake through fish consumption.
- Information about malaria is of continued importance. In addition to telling people how one does get malaria (mosquito bite), it will be useful to inform about behaviors that do NOT cause malaria, such as drinking water with dead mosquitoes.
- Virtually nothing is known about mercury pollution. Mercury information materials should address risk behaviors, disease symptoms, risk groups, and ways to minimize exposure. It is fair to also inform people that small-scale gold mining is not the only source of mercury in Amazon Rivers.

CITED SOURCES

Heemskerk, M. and M. Oliveira.

2003. *Perceptions of small-scale gold mining impacts: Results from focus group discussions in mining camps and affected communities. Tapanahonie & Brokopondo Regions, Suriname*. World Wildlife Fund – Guianas. Grant Agreement FG-64. December 12, 2003. Paramaribo, Suriname.

Mol, H.J. and P. Ouboter.

2004. Downstream Effects of Erosion from Small-Scale Gold Mining on the Instream Habitat and Fish Community of a Small Neotropical Rainforest Stream. *Conservation Biology*, 18(1): 201-214

Sachs, J. and P. Malany.

2002. The Economic and Social Burden of Malaria. *Nature*, 415: 680-685

APPENDIX A. SURVEY

Interviewee ID: _____ Interviewer ID: _____
 Village ID: _____ Date & Time : _____
 Observations: _____

A. Personal Data

In row 8 record all that apply: 1=subsistence farmer, 2= independent gold miner, 3= working with Cambior/Suralco, 4= other wage labor, 5=store owner, 6= hosselen, 7=student, 8= public/government job, 9= does not study or work for income. Test speaking fluency through objective tests, i.e. asking a question in Dutch and French.

| | | |
|----|---|--|
| 1 | Person ID (00000) | |
| 2 | Name | |
| 3 | Group affiliation? 1=Ndjuka, 2= Paramacca, 3=Saramaka, 4=Other | |
| 4 | Sex: 0=woman, 1=man | |
| 5 | Age? | |
| 6 | Number of children | |
| 7 | Marital status (0=single, 1=married/living together, 2= boyfriend/girlfriend) | |
| 8 | Occupation | |
| 9 | Number of years formal education (highest grade obtained) | |
| 10 | Do you speak Dutch? 0 = no, 1 = fluent, 0.5 = just a bit | |
| 11 | Do you speak French? 0 = no, 1 = fluent, 0.5 = just a bit | |
| 12 | Can you read well enough to read book? | |
| 13 | Village of residency | |

B. Information/knowledge/news

1. How often do you receive national news and public information from the following media?

| | | Never | Seldom | Every week | Every day |
|---|---------------------------------------|-------|--------|------------|-----------|
| a | How often o you read the newspaper? | | | | |
| b | How often do you listen to the radio? | | | | |
| c | How often do you watch news on TV? | | | | |

2. Do you know the large posters that are placed at the walls of Medizebs / the school?
Do you understand the message it tries to bring across?

| Understands everything | Partly understands | Does not understand | Does not know the poster | Knows the poster but has not read it |
|------------------------|--------------------|---------------------|--------------------------|--------------------------------------|
| | | | | |

3. If news/information would be brought to you, which is the most preferred medium?

| | | |
|--------------------------------|--------------------------------|---------------------------------|
| <input type="checkbox"/> Radio | <input type="checkbox"/> Oral | <input type="checkbox"/> Other: |
| <input type="checkbox"/> TV | <input type="checkbox"/> Books | |

| | |
|--|--|
| <p>4. What would be the best time for radio/tv programs?</p> <p><input type="checkbox"/> Early mornings (<7 am)</p> <p><input type="checkbox"/> Later in the morning (7-12)</p> <p><input type="checkbox"/> Early afternoon (12-3)</p> <p><input type="checkbox"/> Later in the afternoon (3-6)</p> <p><input type="checkbox"/> Evening (6-9)</p> <p>6. How often do you visit the village/Solang?</p> <p><input type="checkbox"/> Never</p> <p><input type="checkbox"/> A few times a year</p> <p><input type="checkbox"/> Once per month</p> <p><input type="checkbox"/> A few times each month</p> | <p>5. How much would you be willing to pay for a forest newspaper/magazine</p> <p><input type="checkbox"/> Nothing</p> <p><input type="checkbox"/> 0.1-1 Sur. \$ (<1000 Sfl)/ 0.05-0.30 €)</p> <p><input type="checkbox"/> 1-5 Sur. \$ (1000-5000 Sfl)/0.30-1.5 €)</p> <p><input type="checkbox"/> >5 SRD, namely ...</p> <p>7. How do you travel to the city?</p> <p><input type="checkbox"/> Bus</p> <p><input type="checkbox"/> Car</p> <p><input type="checkbox"/> Boat</p> <p><input type="checkbox"/> Airplane</p> |
|--|--|

8. Does the person own a :

| | | | |
|-------------------------|--|-----------------|--|
| a. Car | | Radio (working) | |
| b. Paddle boat | | Telephone | |
| c. Motor boat (Note PK) | | Refrigerator | |
| d. TV (working) | | | |

C. Relation to mining

| | | Yes | No |
|---|---|---------------------------------|----|
| 1 | Are you currently working in the small-scale gold mining sector | | |
| 2 | How many years of small-scale gold mining experience do you have? | # years: | |
| 3 | How many people from your household work in this industry? | # people: | |
| 4 | Do you receive regular economic support from someone involved in this industry? | Estimated contribution :g | |
| 5 | Do you own a store where gold miners can buy goods? | | |
| 6 | Are you working for gold miners in another way, for example to provide transport to them? | | |
| 7 | Are you selling food or groceries to the goldminers (hossel) | | |
| 8 | Do you possess a concession? (Note monthly income) | Income: | |

D. Positive effects on community

1. How do you think gold mining contributes to community well-being/development at this moment?

- Does not contribute at all
- Contributes by providing household income
- Contributes by providing transport
- Contributes by providing job opportunities
- Gold mining earnings buy goods for the village (for example : diesel for generator, pays for burial expenses)
- Contributes by providing cash money to keep stores and bars alive

2. If community members were to start a community development fund, how much do you feel is fair for gold miners to contribute each month?

- Nothing
- 1-2 g
- 3-5 g
- more than 5 g
- They should decide for themselves

E. Negative effects

What is the most negative effect of small-scale gold mining? (Cross of all that are mentioned spontaneously, do NOT go through list)

- Work accidents
- Malaria
- Mercury
- Other illnesses, namely:.....
- Dirty water
- Violence
- Other, namely

F. Malaria

1. How often have you had malaria?

| | | |
|------------------------------------|-------------------------------------|---|
| <input type="checkbox"/> Never | <input type="checkbox"/> 3-5 times | <input type="checkbox"/> More than 10 times |
| <input type="checkbox"/> 1-2 times | <input type="checkbox"/> 5-10 times | |

2. When was the last time that you were ill with malaria?

| | | |
|---|---|--|
| <input type="checkbox"/> In the past three months | <input type="checkbox"/> 1-3 years ago | <input type="checkbox"/> 10+ years ago |
| <input type="checkbox"/> In the past year | <input type="checkbox"/> 3-10 years ago | |

3. How do you think people get malaria? (Cross of all that are spontaneously mentioned; DO NOT go through list).

- Drinking dirty water
- Drinking water with dead mosquitoes or mosquito eggs
- Bite of the mosquito
- It is contagious; you get it from someone else
- Something you eat, such as diseased wild meat
- Poor personal hygiene
- Other:.....

4. Is (answer from 2) the only way from which you can get malaria? Is there no other way? Do not go through list but keep on asking until the interviewee has named all possible options he or she has knowledge of.

- Drinking dirty water
- Drinking water with dead mosquitoes or mosquito eggs
- Bite of the mosquito
- It is contagious; you get it from someone else
- Something you eat, such as diseased wild meat
- Poor personal hygiene
- Other:.....
- You can not get it any other way

5. What do you do to reduce the chances of getting malaria? Go through the list.

- Sleeping with mosquito netting
- Drink forest medicine
- Bath with forest leaves
- Drinking only clean (tap/well) water
- Burn mosquito candles
- Other:

6. Do you know of any plants that protect against malaria? Cross off all that are spontaneously mentioned by the interviewee; do NOT go through the list.

| | |
|---|---------------------------------------|
| <input type="checkbox"/> Pikin masusa | <input type="checkbox"/> Tutu wii |
| <input type="checkbox"/> Papai | <input type="checkbox"/> Wataa Oko |
| <input type="checkbox"/> Swietie siebie | <input type="checkbox"/> Bambusi |
| <input type="checkbox"/> Bita | <input type="checkbox"/> Other: |

G. Mercury

1. Have you ever worked with mercury? Y / N

2. . What ways getting in contact with mercury can damage your health? Cross off first reason mentioned spontaneously.

- Inhaling vapor that appears when the mercury – gold amalgam is burned
- You drink it (for example when you are sucking the mercury out of the amalgam)
- Eating fish that has gotten the mercury into its system
- Drink water that was polluted with mercury
- Skin contact
- Other
- Don't know

3. Is (answer from 2), the only way that mercury can be hazardous to your health? Are there no other options?

- Inhaling vapor that appears when the mercury – gold amalgam is burned
- You drink it (for example when you are sucking the mercury out of the amalgam)
- Eating fish that has gotten the mercury into its system
- Drink water that was polluted with mercury
- Skin contact
- Other
- Don't know

4 When you swallow mercury, what happens with it in your body? Cross off all that are spontaneously mentioned by the interviewee; do NOT go through the list.

- You loose it with defecation/urination
- You loose it another way:.....
- It stays in your body for a long time
- Don't know
- Other:

5. What are the symptoms of mercury contamination in people?

6. Do you know someone who was ill with this disease?

Yes No Don't know

7. Which of the following groups is more at risk for mercury poisoning? Name all three and ask what group of people the interviewee believes is most vulnerable.

- Children
- Pregnant women
- Elderly people
- Men
- Other people:

8. How often do you eat fish? (fresh fish)

- Every day
- A couple of times each week
- A couple of times each month
- Seldom
- Never

9. Researchers have discovered that there are certain types of fish that are more likely to attain the mercury in their body. Do you know for which fish types this is the case?

Don't know

Yes, namely:

10. Do you know which part of the fish harbors the most mercury?

Don't know

Yes, namely:

11. Did researchers visit the village? If they did, have you spoken to them?

a. Yes No

b. What did you learn from them?

c. Did they take hairsamples from either you or your children?

a. Yes No

H. Water pollution and related diseases

1 When was the last time that you or any of your household members has been ill due to drinking dirty water?

| | | |
|-------------------------------------|--|--------------------------------|
| <input type="checkbox"/> Last week | <input type="checkbox"/> In the past year | <input type="checkbox"/> Never |
| <input type="checkbox"/> Last month | <input type="checkbox"/> A couple of years ago | |

2. What illnesses can you get from drinking polluted water Cross off all that are spontaneously mentioned.

| | |
|--|--|
| <input type="checkbox"/> Malaria | <input type="checkbox"/> Stomach ache |
| <input type="checkbox"/> Mercury poisoning | <input type="checkbox"/> Other, namely |
| <input type="checkbox"/> Diarrhea | <input type="checkbox"/> Don't know |

3. The water of the rivers is not as clean as it used to be in earlier years. What do you think is the main cause of the pollution of river water? Cross of the first answer that is given. *Kruis het eerste antwoord aan dat genoemd wordt.*

| | |
|--|---|
| <input type="checkbox"/> People throw garbage in the water | <input type="checkbox"/> The Brasilians |
| <input type="checkbox"/> People defecate in the water | <input type="checkbox"/> Other: |
| <input type="checkbox"/> Small-scale gold mining | <input type="checkbox"/> Nothing else |
| <input type="checkbox"/> Large companies | |

4. Do you think that (the answer from 3) is the only reason? Is there nothing else? Cross of all other reasons mentioned.

| | |
|--|---|
| <input type="checkbox"/> People throw garbage in the water | <input type="checkbox"/> The Brasilians |
| <input type="checkbox"/> People defecate in the water | <input type="checkbox"/> Other: |
| <input type="checkbox"/> Small-scale gold mining | <input type="checkbox"/> Nothing else |
| <input type="checkbox"/> Large companies | |

5. What do you think the gold miners must do to prevent water pollution, because they have to work don't they?

I. Loss of respect for local authorities (granman, kapiteins and basias)

1. Do you believe people in the village have less respect for the granman, kapiteins, and basias today than 10 years ago? Yes / No.

2. If yes, why do you think this is the case? (Cross of all that is spontaneously mentioned)

| | |
|---|--|
| <input type="checkbox"/> Films/TV and fights | <input type="checkbox"/> Influence from the city |
| <input type="checkbox"/> Gold mining | <input type="checkbox"/> The interior war |
| <input type="checkbox"/> The way the children are raised nowadays | <input type="checkbox"/> Other: |
| | <input type="checkbox"/> Don't know |

J. Immigration

1. In the past, there were not as many Brasilians in the interior as there are now. Which positive things have they brought with them?

- Knowledge of gold mining
- Money
- Nothing positive
- Other:

2. Which negative things have they brought with them?

- Water pollution
- They carry all the gold away
- AIDS/SIDA
- Other illnesses :
- Violence and criminality
- Other :

X. Solutions – only for interviewees who are NOT goldminers. For gold miners go to section II.

1. What do you think that the government can do to alleviate the negative impacts of small-scale gold mining?

2. What do you think that the communities themselves can do to alleviate the negative impacts of small-scale gold mining?

3. What do you think that gold miners can do to alleviate the negative impacts of small-scale gold mining?

II. THE FOLLOWING QUESTIONS ARE FOR GOLD MINERS ONLY

| | |
|--|--|
| <p>1. Which type of work do you do in the gold mining industry</p> <ul style="list-style-type: none"> <input type="checkbox"/> Pit worker <input type="checkbox"/> Mine operator <input type="checkbox"/> Traveling merchant <input type="checkbox"/> Store owner <input type="checkbox"/> Transport provider <input type="checkbox"/> Other, namely | <p>2. When you started, with which type of work did you begin?</p> <ul style="list-style-type: none"> <input type="checkbox"/> Pit worker <input type="checkbox"/> Mine operator <input type="checkbox"/> Traveling merchant <input type="checkbox"/> Store owner <input type="checkbox"/> Transport provider <input type="checkbox"/> Other, namely |
|--|--|

| | |
|---|---|
| <p>3. Do you carry a weapon to protect yourself in the mining camps?</p> <p><input type="checkbox"/> Pistol</p> <p><input type="checkbox"/> Rifle</p> <p><input type="checkbox"/> Knife</p> <p><input type="checkbox"/> Other:.....</p> | <p>4. What can be done to prevent these crimes?</p> <p><input type="checkbox"/> Nothing</p> <p><input type="checkbox"/> Bring in city police and military</p> <p><input type="checkbox"/> Private guards</p> <p><input type="checkbox"/> Other:</p> |
|---|---|

M. Alternatives

1. How much money did you make for the last pit that you worked in?

_____ g gold in _____ weeks time

2. How much money did you make for the pit before last?

_____ g gold in _____ weeks time

3. If you would earn the same amount of money, would you trade your current job in gold mining for (go through list):

- A job with Cambior/Suralco
- A job with lanti in the village
- Logging or something else in the interior, away from your village
- A wage labor job in the city (construction) -Suriname/French Guiana
- Hosselen in the city -Suriname/French Guiana
- Other, namely.....

4. For what alternative wage would you leave small-scale gold mining (amounts in Euro)?

<100 100 200 400 1000 More, namely Under no circumstances

5. What might be the benefits of working for a large-scale mining company such as Cambior?

6. What kind of troubles do the larger scaled mining companies have to deal with?

APPENDIX B. PLANTS OF WHICH THE STEM, BARK, OR LEAFS ARE USED AS FOREST MEDECIN AGAINST MALARIA*

| Local name | Latin name |
|--|----------------------------|
| <i>Named by more than 2% of people</i> | |
| Bitá (22.1%) | n/a |
| Swietie sisibi (16.9%) | <i>Scoparia dulcis</i> |
| Bambusi or Tutu wii (22.3 %) | <i>Bambusa vulgaris</i> |
| Wataa oko (8.5%) | <i>Hibiscus bifurcates</i> |
| Pikin masusa (5.6%) | <i>Renealmia exaltata</i> |
| Papai (2.4%) | <i>Carica papaya;</i> |
| <i>Named by less than 2% of people</i> | |
| Zuurzak blad | n/a |
| Genti wii | n/a |
| Pije pije wii | n/a |
| Sabi wii | n/a |
| Feba wii | n/a |
| Knopoe/ Canopo wii | n/a |
| Djankoimata | n/a |
| Ton ton tiki | n/a |
| Manjablad | n/a |
| Mangrassi | n/a |
| Cocu mata | n/a |
| Lemiki (met koffie) | n/a |
| Pasmiri | n/a |
| Man nauga | n/a |
| Busi knoflook | n/a |
| Kasa odoe | n/a |
| Mata wii | n/a |
| Kapaa buba | n/a |
| Njefoo udu | n/a |
| Kokonotu wii | n/a |
| Paansi mutu buba | n/a |
| Guana wii | n/a |
| Lebi katun wii | n/a |
| King keesi | n/a |
| Rode klaverblad | n/a |
| Sopropo wii | n/a |
| Kifini maka | n/a |
| Kou wii | n/a |
| Odoe odoe | n/a |
| Dongtua | n/a |
| Man batoto | n/a |
| Doeloe doeloe | n/a |
| Pompoen bloem | n/a |

* 33 % of people mentioned not knowing any type of forest medicine against malaria