### الهيئة الإشرافية

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### العنوان:

الجمهورية اليمنية، صنعاء، وزارة الصحة العامة والسكان، مركز البحوث، مرفأ الهايا: 252192.
مشرف: 3797. Email: hrdcym@hotmail.com
الإفتتاحية:

يشكل النشر والدوريات العلمية أهم وسيلة للتواصل بين جمهور الباحثين وبين الجهات المعنية بنتائج تلك الأبحاث، وبالنظر إلى محدودية وضعف الدوريات العلمية المحكمة في المجال الصحي والطبي بالداخل، فإن معظم الباحثين يجئون على نشر أبحاثهم وإنتاجهم العلمي في دوريات علمية محكمة خارج الوطن، مما يجعل تلك الأبحاث وما توصلت إليه من نتائج بعيدة عن متناول قطاع كبير من الأطباء والصيدلة وطلبة كليات الطب والعلوم الصحية ومنتسبي القطاع الصحي والجهات الأخرى ذات العلاقة بالصحة العامة.

لذلك تأتي هذه المحاولة من وزارة الصحة من خلال مراكز البحث بإصدار مجلة دورية تعنى بالبحوث والدراسات الصحية والطبية اليمنية والتي تهدف إلى تجميع تلك الأبحاث والمقالات الطبية والصحية المنشورة منها في الدوريات الخارجية أو التي لم يتاح لها النشر، لتكوين رسالة دورية مثيرة لمجاهدات جمهور الباحثين المعتمدين والجهات ذات العلاقة بالصحة العامة.

ولاشك بان هذه المحاولة تعتبر خطوة جيدة في الأمام ويكون الإنجاز الصحي، وسوف تسمح بتعزيز نقصاً في مجال المعلومات ظل يعاني منه نظامنا الصحي وجمهور الباحثين، ويبيني أن يتميز هذا الدور ويتطور نموياً من خلال تفاعل المجتمع والتشجيع المشترك بين وزارة الأشخاص وساهمين وطلاب الطب اليمنيون بما يسمح من خلق تواصل معيّنة وخبرات عملية حتى نصل بهذه الدورية لتكوين دورية علمية محكمة بمشاركة الجميع.

ومن المؤكد بأن فعل هذا سوف يعزز التفاعل الإيجابي والشراكة الفعّالة بين دور الوزارة والخبرات العلمية الأكاديمية لتحقيق الأهداف الصحية من خلال منهجية علمية تسهم فيه تفاعل البحث العلمي بالدور الأساسي وقد يعاني الشرع، بالإضافة إلى النشر بدور البحوث بользоватل والتي دون شك سوف تساعد على اختصار العديد من المعوقات التي ظلت تراكم، وتحول دون تحقيق الإصلاح والتنمية الصحية المنشودة.

شكرًا للأخي، وله إصدار هذه مجلة وتنميتها للاستمرار والتطور.

أ. محمد يحيى النعمي
وزير الصحة العامة والسكان
كلمة العدد:

أولاً، فإن البدء تتوجه بالشكر والتقدير لجميع من تفاعل مع إصدار العدد التجريبي ديسمبر 2003م، من مجلة البحوث الطبية والصحية اليمنية، ووجه لنا الملاحظات وصوب عدد من الأخبار سواء التي سكنا نقتربها أو التي لم نحن نتهمني إليها لولا تفاعلكم معنا.

كما توجه بالشكر والتقدير لراعي هذه المجلة الأستاذ الدكتور محمد حبيبي النغمي-وزير الصحة العامة والسكان، الذي وقف معنا موجهاً ومشجعاً ونأمل أن تكون إصدارات المجلة منتظمة ومتميزة عدداً بعد آخر بفعل توجيهاته الكرامة. ولا ننسى أن هذا الحيز أن توجه بالشكر والتقدير أيضاً للأخوة في مكتب الاتحاد الأوروبي بالوزارة والذي لولا تشجيعهم ومساعدتهم لما صدر هذا العدد في موعده المحدد.

ولقد طلنا من وسائل الاتصال الأخرى بالباحثين في الأبحاث ذات الأهمية العلمية بما يخدم بلادنا، كما حاولنا البحث عن عدد من المحترفين المحليين الذين ينتمون لمنتسبي جامعة عدداً كبيراً منها، غير أننا حرصنا أن ننشر ما هو من نتائج قانونياً لإعادة النشر في الدوريات المحلية، حتى تناج النتائج وتكون الأبحاث مستفادة منها، وتحقيق أهدافها بعون الله.

لندع الشكر ونأمل أن يكون العدد القادم غني بماحتوياته وأكثر دقة في إعداده بعون الله ودمعكم.

وألفين كرم...

طارق صلاح أحمد
مدير عام مركز البحوث والتوثيق
نائب رئيس التحرير
التعريف:

تأسس بوزارة الصحة العامة والسكان عام 1997م، ويُعتبر من المراكز المتخصصة ذو المهام والأهداف النوعية، ومكون رئيسي وهام وداعم لبرامج الصحة والسياسات الصحية والإصلاح الصحي، ويعتمد على الكوارد الوطنية الأكاديمية في تنفيذ برامجه وأهدافه.

الأهداف العامة:
1) تحديد السياسات والاستراتيجيات وأولويات البحوث الصحية والطبية.
2) تعزيز قدرات البحوث الصحية والطبية وتنمية مهارات الكوارد في إعداد وتنفيذ الأبحاث والدراسات الصحية وتحقيق دور البحث العلمي في سياسات وبرامج النظام الصحي، والدفاع بالاستفادة من نتائجها.
3) تشغيل اللجنة الوطنية للبحوث الصحية والطبية وتفعيل دورها .. خاصة في الضوابط الأخلاقية للبحوث الصحية.
4) تأسيس فروع لأنشطة البحوث الصحية والطبية في المدن الرئيسية: عدن، الحديدة، تعز، حضرموت ..
5) تأسيس مكتبة مرجعية متخصصة تعتمد على وسائل التقنية الحديثة.
6) التسليط والتعاون مع البرامج الصحية والمؤسسات الأكاديمية والجهات الحكومية والمنظمات الدولية ذات العلاقة لتطوير وتشييد البحوث الصحية والطبية.
7) توثيق البحوث والدراسات والتجارب الصحية والطبية.
Update News of Health Research
أخبار البحوث

يجري المركز حاليا دراسة تقييمه حول جدوى ومخرجات الأنشطة التدريبية القصيرة المتفاوتة في عدد من برامج وزارة الصحة العامة والسكان وهي ضمن الدراسات التقييمية والتي ستشمل الأموال: 2003، 2004، وسوف تفيد نتائج هذه الدراسة في تصحيح الأداء وأنشطة التدريب القصيرة بما يسمح بتحقيق الأهداف من هذا النشاط المهم، وسوف تنفيذ هذه الدراسة بالتعاون مع وحدة السياسات بالوزارة وتعاون الاتحاد الأوروبي.

• كما يجري التحضير حاليا لإعداد خطة الدراسة التي سوف ينفذها المركز في بحث (الصحة العامة وفucherية) في أقسام الطوارئ والحرواد، وهي دراسة تقييمه أيضًا لعدد من المستشفيات المركزية في عدد من المحافظات: الأمانة، عدن، الجديدة، تعز، الضالع، إtc.; وسوف تهدف الدراسة إلى تقييم الوضعية الحالية لأقسام الطوارئ والحرواد، ومدى الصحة العامة ووضعية الخدمات العلاجية لهذه الأقسام وطاقمتها الفنية والبشرية، والمتطلبات اللازمة لتنفيذ دورها.

والدراسات ضمن بحوث النظم الصحية التي يسعى المركز لتقديمها في إطار سياسات الإصلاح التي تنتجها الوزارة.

• التدريب على إعداد وتنفيذ البحوث الصحية: ضمن سياسات وبرامج مرتكز البحوث بالوزارة لهذا العام. تجريد 120 من الكادرات الصحية (أطباء، ودرازين، و الفنيين) على الخطوات النهائية في إعداد وتنفيذ البحوث الصحية (على الأخص بحوث النظم الصحية والخدمات)، وسوف يبدأ المركز نشاطه التدريبي بدورتين أولتين خلال شهر أبريل، بإمامة العاصمة بمشاركة فيها (30 متدرب من الكادرات الصحية بإمامة العاصمة ومشاركين من عدد من المحافظات والثانية خلال شهر مايو، عدد (30 مشارك) من المحافظات الأخرى بالإضافة إلى دورتين سوف تعقد بتكريم من محافظة حضرموت، ومحافظة الحديدة، عدد خمسين مشارك، إيط القيادة العام، بإذن الله.
# Medical Conferences

List of Medical Conferences in the Region sorted by country

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<td>8-May-2004</td>
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Sudan
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</table>
Health and medical research priorities

In June 2003, Researches and Documentation Centre of Ministry of Public Health and Population (MoPH&P) in collaboration of World Health Organization (WHO) has organized a workshop on medical and health research priorities in Yemen, which was facilitated by the WHO consultant, Prof. AlShaikh Mahjoob and participated by national experts from local medical schools, Deputy Minister of Higher Education and Scientific Research, MoPHP programme officers, and researchers from other public health-related agencies. Raised suggestions have been distributed among participants in three groups to weigh the priority of each health problem following a specific standard basis. Group discussion has resulted in five recent priorities, which can be reviewed annually. These research priorities are:

1- Researches in communicable and endemic diseases.
   All epidemiological researches, particularly on:
   - Malaria.
   - Tuberculosis.
   - Diarrhoea
   - Respiratory infections.
   - Schistosomiasis.
   - HIV/AIDS.
   - Leprosy.

2- Researches in maternal and child health.
   - Maternal and child health care.
   - Reproductive health.
   - Nutrition.

3- Researches and studies in health systems.
   - Health policies.
   - Health economy and resource development.
   - Managerial and manpower development.
   - Health legislation.

4- Researches in health-enhanced behaviours and environments.
   - Health education and information.
   - School health, environmental health, and occupational health.
   - Rationalization of drug usage.
   - Qat.
   - Traditional folk medication (the alternative complementary medicine).

5- Researches in noncommunicable diseases.
   - Kidney diseases (Nephropathias).
   - Cardiovascular diseases.
   - Cancers, and blood diseases (Heamatopathias)
   - Diabetes mellitus.
Research
Prevalence of known diabetes and hypertension in the Republic of Yemen

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Volume 8, No. 2&3, March 2002

ABSTRACT: The present study was undertaken to determine the prevalence of known cases of diabetes and hypertension among adults in Sana’a city. Thus 1080 persons aged 20–85 years were selected for interview using a multistage random sampling technique. The crude prevalence of known diabetes was 6.57% (95% CI: 5.2–8.2) and of known hypertension 13.5% (95% CI: 11.5–15.6). The age-standardized prevalence for the age range 30–64 years was 9.75% (95% CI: 7.55–11.95) for diabetes and 17.1% (95% CI: 15.0–19.2) for hypertension. These results provide an estimate of the prevalence of known diabetes, hypertension and related vascular events in a well-defined urban community.

Introduction

An epidemic of diabetes appears to be taking place in adults throughout the world. This trend appears strongly related to lifestyle and socioeconomic changes [1]. Much of the international variation in the prevalence of type 2 diabetes in adults may be attributed to differences in environmental factors and genetic susceptibility [2,3]. In developing countries, diabetes is gaining prominence as infectious and nutritional causes of sickness and death have become less significant [4]. Data on the epidemiology of type 2 diabetes in the Arab population indicate a prevalence rate of 10%–20%, reflecting a moderate genetic susceptibility [3].

In the Republic of Yemen, the population is homogeneous and ethnically uniform. Our knowledge of diabetes epidemiology among Yemenis remains poor and no relevant publications have yet appeared in the international literature. The present study was undertaken to determine the prevalence of “known” cases of diabetes and hypertension among adult subjects aged 20 years or over within the community of the capital city, Sana’a. This was an initial survey, to be followed by a second phase to study the prevalence of symptomatic and asymptomatic cases of glucose intolerance and hypertension and other cardiovascular risk factors in the same community.

Methods

This was a cross-sectional, population-based study conducted in the capital city, Sana’a, over a 4-month period from March to May 2000.
The sample size was calculated using Epi-Info, version 6.02 taking into consideration the following criteria: total target population (i.e. adult population aged ≥ 20 years living in Sana’a city): 464 000 people; desired precision: 2.5%; expected frequency: 3.5% for known diabetes and hypertension, estimated since no previous study has been conducted in the country; sample size with 95% confidence interval (CI): 1294 people. The sampling procedure was based on a multistage random technique. In the first stage, Sana’a city was divided into four geographic zones; one-fourth of the sample was drawn from each zone. The second stage involved the random selection of one “election circle” from each geographic zone. In the third stage each selected election circle was divided into streets. The fourth stage included the random selection of four streets within each election circle: it was planned to interview 80 participants from each street (40 males and 40 females). The fifth stage was the systematic random selection of houses from each street and one participant (≥ 20 years old) from each household. The survey team included 16 volunteers in each geographic zone (a total of 64 volunteers), who were final-year students in the Department of Sociology, University of Sana’a. These future social researchers were chosen because they were trained in fieldwork and were able to sensitize people to the aims of the study and to encourage their participation. They visited the randomly selected households in groups of four volunteers and inquired about diabetes, hypertension, heart attack and stroke, using standard terms. The volunteers were taught how to administer a predesigned questionnaire. Details taken included the participant’s name, age, sex, place of birth, current residence, standard of education reached, presence of diabetes mellitus (and age at which diabetes was diagnosed), presence of hypertension, ischaemic heart disease or stroke, and any family history of diabetes, hypertension, ischaemic heart disease or stroke in the parents, siblings, spouse or offspring. The questionnaire format was verified by validity and reliability testing. Reliability was ensured by pretesting a subsample of 100 subjects. The survey team was provided with a list of specific drugs used in the management of diabetes mellitus, hypertension, ischaemic heart diseases and stroke.

“Known diabetes mellitus” was defined as a person with documented, physician-diagnosed diabetes mellitus, or a person taking oral hypoglycaemic agents or insulin as confirmed by the survey team. Early onset type 2 diabetes mellitus (EODM) was defined as diabetes with age at diagnosis of 25–39 years, and late onset diabetes mellitus (LODM) as diabetes diagnosed at the age of 40 years or more. “Known hypertension” was defined as a person with physician-diagnosed hypertension, who was taking antihypertensive medication as confirmed by the survey team. “Known ischaemic heart disease” (IHD) was defined as a person with history of heart attack requiring hospitalization, or a person with physician-diagnosed IHD who was taking medication as confirmed by the survey team. “Known stroke” was defined as a person with a history of abrupt-onset weakness or paralysis of one side of the body, with or without a history of hospitalization, or a person with physician-diagnosed stroke and currently experiencing weakness or paralysis of one side of the body.

Urbanization status was categorized as urban (has lived in the city since childhood) or urbanizing (has moved from a rural to an urban setting).

Data were analysed with SPSS, version 6.02 and the Confidence interval analysis (CIA) software package, version 1.0 [5].
The prevalence rates and 95% CI of known diabetes mellitus and hypertension for the Yemeni population between the ages of 30 and 64 years were calculated using the world population as the standard [6,7]. According to this method, the prevalence rates were standardized for age within a truncated age range of 30–64 years using 10-year age groups and the Yemeni population in the year 2000. Continuous variables were expressed as means ± standard deviation and a two-tailed t-test was used to calculate the statistical significance. The chi-squared test was used to analyse categorical variables. Two by two tables were used to calculate relative risk. 95% s were computed to indicate the precision of sample estimate, the variability of the characteristics being studied, and the degree of confidence required. A P-value < 0.05 was taken as statistically significant.

Results
A total of 1294 persons aged ≥ 20 years were invited for interview. Women represented 54% of the total sample. Of those invited, 1080 persons responded, giving an overall participation rate of 83.5%. Table 1 gives the sample size, the number of people interviewed by age and sex, and the participation rate by sex.

Table 1 Distribution of participants interviewed by age and sex

<table>
<thead>
<tr>
<th>Age (years)</th>
<th>Male</th>
<th></th>
<th></th>
<th>Female</th>
<th></th>
<th></th>
<th>Total</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>No.</td>
<td>%</td>
<td>No.</td>
<td>%</td>
<td>No.</td>
<td>%</td>
<td>No.</td>
<td>%</td>
<td></td>
</tr>
<tr>
<td>20–24</td>
<td>47</td>
<td>8</td>
<td>95</td>
<td>13.6</td>
<td>142</td>
<td>11</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>25–29</td>
<td>112</td>
<td>18.9</td>
<td>140</td>
<td>20</td>
<td>252</td>
<td>19.5</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>30–34</td>
<td>93</td>
<td>15.7</td>
<td>113</td>
<td>16.2</td>
<td>206</td>
<td>16</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>35–39</td>
<td>75</td>
<td>12.6</td>
<td>79</td>
<td>11.3</td>
<td>154</td>
<td>12</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>40–44</td>
<td>52</td>
<td>8.7</td>
<td>61</td>
<td>8.7</td>
<td>113</td>
<td>8.7</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>45–49</td>
<td>47</td>
<td>8</td>
<td>47</td>
<td>6.7</td>
<td>94</td>
<td>7.2</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>50–54</td>
<td>50</td>
<td>8.4</td>
<td>46</td>
<td>6.6</td>
<td>96</td>
<td>7.4</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>55–59</td>
<td>48</td>
<td>8</td>
<td>45</td>
<td>6.4</td>
<td>93</td>
<td>7.2</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>60–64</td>
<td>40</td>
<td>6.7</td>
<td>45</td>
<td>6.4</td>
<td>85</td>
<td>6.5</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>65+</td>
<td>30</td>
<td>5</td>
<td>29</td>
<td>4.1</td>
<td>59</td>
<td>4.5</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total invited</td>
<td>594</td>
<td></td>
<td>700</td>
<td></td>
<td>1294</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total sampled</td>
<td>514</td>
<td></td>
<td>566</td>
<td></td>
<td>1080</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Participation rate (%)</td>
<td>86.5</td>
<td></td>
<td>81</td>
<td></td>
<td>83.5</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

The median age of the study population was 33 years (range 20–85 years). Mean age was 35.4 ± 11.0 years (males: 37.5 ± 12.0 years; females: 33 ± 10.0 years). Table 2 shows that 88% of the study population were literate and 38% had university education. About 56.5% of this population were urbanizing (had moved from a rural to an urban setting), with an urbanizing:urban ratio of 1.3.

Table 2 Basic characteristics of the study population (n = 1080)

<table>
<thead>
<tr>
<th>Characteristics</th>
<th>Male (n = 514)</th>
<th>Female (n = 566)</th>
<th>Total (n = 1080)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age (years)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mean ± sa</td>
<td>37.5 ± 12.0</td>
<td>33 ± 10.0</td>
<td>35.4 ± 11.0</td>
</tr>
<tr>
<td>95% CI of mean</td>
<td>36.5–38.6</td>
<td>32.6–34.0</td>
<td>34.7–36.0</td>
</tr>
<tr>
<td>Median (range)</td>
<td>35 (20–85)</td>
<td>31 (20–80)</td>
<td>33 (20–85)</td>
</tr>
<tr>
<td>Standard of education</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Illiterate</td>
<td>57 (11.0%)</td>
<td>67 (12.0%)</td>
<td>124 (12.0%)</td>
</tr>
<tr>
<td>Basic education</td>
<td>138 (27.0%)</td>
<td>199 (35.0%)</td>
<td>337 (31.0%)</td>
</tr>
<tr>
<td>Secondary education</td>
<td>105 (20.0%)</td>
<td>102 (18.0%)</td>
<td>207 (19.0%)</td>
</tr>
<tr>
<td>University education</td>
<td>214 (42.0%)</td>
<td>198 (35.0%)</td>
<td>412 (38.0%)</td>
</tr>
<tr>
<td>Urbanization status</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Urbanizing</td>
<td>316 (61.5%)</td>
<td>294 (52.0%)</td>
<td>610 (56.5%)</td>
</tr>
<tr>
<td>Urban</td>
<td>198 (38.5%)</td>
<td>272 (48.0%)</td>
<td>470 (43.5%)</td>
</tr>
<tr>
<td>Urbanizing/urban ratio</td>
<td>1.6</td>
<td>1</td>
<td>1.3</td>
</tr>
<tr>
<td>Age at diagnosis of diabetes</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>EOMD (&lt;40 years)</td>
<td>28 (70.0%)</td>
<td>18 (58.0%)</td>
<td>46 (65.0%)</td>
</tr>
<tr>
<td>LOMD (≥40 years)</td>
<td>12 (30.0%)</td>
<td>13 (42.0%)</td>
<td>25 (35.0%)</td>
</tr>
<tr>
<td>Total</td>
<td>40 (100%)</td>
<td>31 (100%)</td>
<td>71 (100%)</td>
</tr>
</tbody>
</table>

aSignificant difference males versus females (P < 0.05).
s = standard deviation.
EOMD = early onset diabetes mellitus.
LODM = late onset diabetes mellitus.

The prevalence rates and 95% CI of known diabetes mellitus and hypertension in the study population are given in Table 3. The crude prevalence rate of known diabetes mellitus was 6.57% (95% CI: 5.2–8.2), with a slightly higher rate in males than in females (7.8% versus 5.5%). Using the world population as the standard [6,7], the age-standardized prevalence rate of known diabetes mellitus in a truncated age range of 30–64 years for the Yemeni standard population for the year 2000 was 9.75% (95% CI: 7.55–11.95) with a slightly lower rate in males (9.4%, 95% CI: 7.9–10.9) compared to females (11.8%, 95% CI: 9.9–13.7).

Table 3 Crude and age-standardized prevalence rates of known (previously diagnosed) diabetes mellitus and hypertension in the adult population in Sana’a, Republic of Yemen

<table>
<thead>
<tr>
<th>Condition</th>
<th>Crude prevalence (20–65 years) (n = 1080)</th>
<th>Age-standardized prevalence (30–64 years) (n = 664)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>%</td>
<td>95% CI</td>
</tr>
<tr>
<td>Diabetes mellitus</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>7.8</td>
<td>5.6–10.4</td>
</tr>
<tr>
<td>Female</td>
<td>5.5</td>
<td>3.75–7.7</td>
</tr>
<tr>
<td>Total (M+F)</td>
<td>6.57</td>
<td>5.2–8.2</td>
</tr>
<tr>
<td>Hypertension</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>12.6</td>
<td>9.8–15.5</td>
</tr>
<tr>
<td>Female</td>
<td>14.3</td>
<td>11.4–17.2</td>
</tr>
<tr>
<td>Total (M+F)</td>
<td>13.5</td>
<td>11.5–15.6</td>
</tr>
</tbody>
</table>

aUsing the world population as the standard.

The crude prevalence rate of known hypertension was 13.5% (95% CI: 11.5–15.6) with a slightly higher rate in females compared to males (14.3% versus 12.6%). Again using the world population as the standard, the age-standardized prevalence rate of known
hypertension for the age range 30–64 years in the Yemeni population was 17.1% (95% CI: 15–19.2) with relatively lower rate in males (12%, 95% CI: 9.8–14) compared to females (21.8%, 95% CI: 20–23.6).

The coexistence of known cases of diabetes mellitus, hypertension, ischaemic heart disease or stroke in the study population is shown in Figure 1. It indicates that hypertension was more frequent than diabetes mellitus (14% versus 7%) and that both had co-morbidity with each other (3%) and with ischaemic heart disease (2%) and stroke (1%).

Table 4 Prevalence of known cases of diabetes, hypertension, ischaemic heart disease and stroke among the relatives of index subjects (n = 1080)

<table>
<thead>
<tr>
<th>Participant</th>
<th>Diabetes</th>
<th>Hypertension heart disease</th>
<th>Ischaemic</th>
<th>Stroke</th>
</tr>
</thead>
<tbody>
<tr>
<td>Index subjects</td>
<td>71 (14.0)</td>
<td>146 (20.0)</td>
<td>27 (11.0)</td>
<td>8 (9.9)</td>
</tr>
<tr>
<td>Father</td>
<td>169 (33.4)</td>
<td>169 (23.8)</td>
<td>89 (36.2)</td>
<td>28 (34.6)</td>
</tr>
<tr>
<td>Mother</td>
<td>92 (18.0)</td>
<td>173 (24.3)</td>
<td>45 (18.3)</td>
<td>14 (17.3)</td>
</tr>
<tr>
<td>Brother</td>
<td>63 (12.4)</td>
<td>58 (8.1)</td>
<td>45 (18.3)</td>
<td>13 (16.0)</td>
</tr>
<tr>
<td>Sister</td>
<td>35 (7.0)</td>
<td>51 (7.2)</td>
<td>15 (6.1)</td>
<td>6 (7.4)</td>
</tr>
<tr>
<td>Spouse</td>
<td>61 (12.0)</td>
<td>95 (13.4)</td>
<td>23 (9.3)</td>
<td>10 (12.3)</td>
</tr>
<tr>
<td>Offspring</td>
<td>16 (3.2)</td>
<td>19 (2.7)</td>
<td>2 (0.8)</td>
<td>2 (2.5)</td>
</tr>
<tr>
<td>Total</td>
<td>507 (100)</td>
<td>711 (100)</td>
<td>246 (100)</td>
<td>81 (100)</td>
</tr>
</tbody>
</table>

Values given are no. (%).

This population-based survey in the capital city has elicited important information about the prevalence of known cases of diabetes mellitus, hypertension and vascular events of the heart and brain among the study population and their relatives. Table 4 indicates that a history of known diabetes was present in 507 subjects and their relatives with a peak prevalence in fathers (33.4%), then mothers (18%), and to a lesser extent in the index subjects (14%) and their brothers (12.4%) and spouses (12%). A history of known hypertension was reported in 711 subjects and relatives with nearly equal frequency in mothers (24.3%) and fathers (23.8%), then index subjects (20%) followed by their spouses (13.4%). A history of known ischaemic heart disease was reported by 246 participants with a peak prevalence in fathers (36.2%), followed by mothers and brothers (18.3% each), then in the index subjects themselves (11%). A history of known stroke was reported by 81 subjects and relatives with a peak prevalence in fathers (34.6%), followed by mothers (17.3%), brothers (16%) and spouses (12.3%). The prevalence among index subjects was lower (9.9%).

Of the diabetic participants, 35 had diabetic parents and 36 did not (Figure 2). Of the 35 diabetic parents, 25 (71.4%) had late onset diabetes (onset ≥ 40 years), while 29 (83%) of their diabetic offspring had early onset diabetes (onset <40 years). The diabetic offspring of non-diabetic parents had an approximately equal opportunity of having either early onset diabetes mellitus (n = 17, 47%) or late onset diabetes mellitus (n = 19, 53%).

An analysis of the familial aggregation of diabetes among first-degree relatives is given in Table 5. Most of the higher observed than expected (Ob-Ex) frequencies (+9.7) in patients with diabetes came from the presence of diabetes in one or both parents and one or more siblings, and to a lesser extent from diabetic parents only (+5). Conversely, the
only higher observed than expected (Ob-Ex) frequencies (+16) in non-diabetic subjects came from the non-diabetic parent(s) and sibling(s). This contribution of family history of diabetes among first-degree relatives to the occurrence of diabetes in index subjects was statistically significant ($\chi^2 = 51.4$, df = 3, $P < 0.0001$).

In order to study the genetic dose-response effect, the relative risk (RR) and 95% confidence interval for diabetes were calculated based on the prevalence of diabetes among first-degree relatives. The relative risk (RR) of diabetes in persons with non-diabetic family members was significantly negative (RR = 0.38, 95% CI: 0.24–0.59, $P = 0.00001$). In persons with one diabetic family member, the risk was low (RR = 1.36, 95% CI: 0.82–2.25, $P = 0.3$), but still 3.6 times higher than the risk for persons with no diabetic family members. The relative risk of diabetes in persons with two or more diabetic family members was high (RR = 4.95, 95% CI: 3.0–8.0, $P = 0.00001$). There was 13-fold increase in the risk compared to persons with no diabetic family members, and 4.4-fold increase in the risk compared to persons with only one diabetic family member.

**Discussion**

This population-based survey was conducted in adults aged ≥20 years living in an urban community. The crude prevalence rates of known cases of diabetes mellitus and hypertension were 6.6% and 13.5% respectively. With age-standardization for the age range 30–64 years in the Yemeni population, the prevalence of known diabetes and hypertension rose to 9.75% and 17.1% respectively.

In population-based studies of the prevalence rates of diabetes mellitus in adults, previously diagnosed (known) cases of diabetes have been found to account for 64% of the total estimated by measuring fasting capillary blood glucose, and 55% of the total estimated by measuring capillary blood glucose 2 hours after an oral glucose load [8]. Based on these observations, we might assume that the previously mentioned age-standardized prevalence of diabetes would be doubled if the estimate were based on measuring blood glucose 2 hours after oral glucose load.

Several studies have recently been published indicating the prevalence of known diabetes and hypertension in the Eastern Mediterranean Region (EMR). In Egypt, the crude prevalence of previously diagnosed (known) diabetes in low socioeconomic urban areas among adults aged ≥20 years was found to be 8.4% versus 5.1% newly diagnosed cases. In high socioeconomic urban areas, the prevalence of known diabetes was equal to that of newly diagnosed diabetes (each 10%) [9]. The prevalence of known diabetes in low socioeconomic urban areas of Lebanon was found to be 13.9% in the age group 30–64 years and 30.2% in the group aged 65 years and over. In high socioeconomic urban areas, the prevalence of known diabetes was 3.0% in the age group 30–64 years and 14.3% in the age group ≥65 years. Within each socioeconomic class and each age group, the prevalence of newly diagnosed diabetes was lower than that of known diabetes [10].

The overall prevalence of self-reported (known) diabetes in urban communities in males aged ≥15 years in Saudi Arabia was 6.6% versus 5.1% for newly diagnosed cases, while for females the respective frequencies were 7.0% and 6.8%. Rates for known diabetes increased with age, from 1.6% for males and 1.4% for females in the age group <30 years to 11.2% for males and 14.8% for females in the age group 30–60 years to 21% for males and 24.4% for females in the age group >60 years [11]. The prevalence of previously diagnosed (known) diabetes in the Bahraini population aged ≥20 years attending primary health care centres was 17.3% (males 18.4%, females 16.7%). By contrast, the rate of
newly diagnosed diabetes was 8.2% (males 8.0%, females 8.3%) [12]. In the urban population aged ≥ 20 years in Sousse, Tunisia, the prevalence of known diabetes was 10.2% (males 7.2%, females 11.5%) [13]. A much lower prevalence of known diabetes was reported in an urban community in northern Sudan, where the crude prevalence in adults aged ≥ 25 years was found to be only 1.45% which was about 60% of the new cases [14]. A summary of reports from different Arab countries in the region is given in Table 6. The conclusion derived from these reports is that the prevalence rate of known diabetes in the urban adult population aged ≥ 20 years is similar in many countries in the EMR, with a few exceptions. However, if the age-standardized prevalence for the age range 30–64 years in each country were calculated, the results would probably be easier to compare. One further observation is that the prevalence rate of known diabetes in the majority of these reports is either equal to or greater than the prevalence of newly diagnosed cases. In other populations, such as the population in the United States aged 20–74 years [15] or an Iranian population in Isfahan aged ≥ 40 years [16], the prevalence rate of known diabetes was almost equal to that of newly diagnosed diabetes. The crude and age-standardized prevalence rates of hypertension observed in this study were even higher than those of diabetes. Data on hypertension reported from many countries in the EMR have indicated that at least 20% of the population aged 20 years or older suffers from hypertension [17]. According to a recent survey, about 30.4% of the adult population in Egypt are hypertensive [18]. Similarly, the prevalence of hypertension based on new WHO criteria in the urban population in Tunisia aged ≥ 20 years was found to be 28.9% [13].

Data presented in this study on the prevalence of known diabetes, hypertension and related vascular events of the heart and brain point to a substantial degree of familial clustering of these diseases among the index subjects and their relatives. This clustering might reflect the magnitude of the population distribution of diabetes and cardiovascular diseases as a result of the rapid socioeconomic development in the Republic of Yemen over the last three decades. These advances have been accompanied by a change to a modern lifestyle and the emergence of noncommunicable diseases as a dominant feature of community health [19,20]. Information on the age at which diabetes was diagnosed in adults in this study indicates that about 65% of the index subjects developed the disease below the age of 40 years. In a previous diabetic clinic population study, we found that only 16% of adult onset diabetes was diagnosed under the age of 40 years [20]. The occurrence of early onset diabetes mellitus among the majority of the diabetic offspring of parents with late onset diabetes mellitus might be attributed to the effect of environmental factors that unmask the disease in genetically susceptible persons at an earlier age. The contribution of diabetic parents to the occurrence of diabetes in the offspring was evident in this study and it was strengthened by the number of diabetic sibling(s). We have previously demonstrated the role of familial clustering in the development of early onset diabetes mellitus in Yemeni patients, with increasing risk of type 2 diabetes in a person as the number of diabetic family members increases [21]. A recognized difficulty in studies of this type is variability in the recall of events in the family history of diabetes, hypertension and related cardiovascular and cerebrovascular events. To overcome this difficulty, we taught the survey team individually how to administer the questionnaire. It should also be noted that this study did not search for
undiagnosed cases of diabetes mellitus and hypertension, as this initial survey was conducted to determine the prevalence of known diabetes and hypertension in the community.

In conclusion, determining the prevalence of known (previously diagnosed) diabetes and hypertension in the community represents an inexpensive and noninvasive method for the identification of the magnitude of the problem with reasonable sensitivity, especially when the participation rate is high and therefore selection bias is unlikely. Given the characteristics of the method used, the results obtained provide the national health system in the Republic of Yemen with an estimate of the prevalence and population distribution of diabetes mellitus, hypertension and related cardiovascular and cerebrovascular events in a well-defined urban community. In order to quantify exactly the magnitude of the problem in the community, further population-based studies are recommended, including investigation of diagnosed and undiagnosed cases of diabetes and hypertension and screening for population distribution of other cardiovascular risk factors.

Acknowledgements
We are grateful to the survey team for completing the field work efficiently and on time. We are also grateful to the teaching staff, Department of Sociology, University of Sana’a for their support of the study. The statistical advice provided by Mr Mohamed Al-Kubati is highly appreciated.

References
Malaria in pregnancy in Hodiedah, Republic of Yemen

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Volume 8, No. 2&3, March 2002.

ABSTRACT In the Republic of Yemen, Plasmodium falciparum is the predominant causative agent of malaria and is associated with adverse consequences for pregnant women and their babies. The prevalence and clinical manifestations of malaria among 500 pregnant (260) and non-pregnant (240) women were compared. Clinical examinations, laboratory investigations and a structured questionnaire were used to collect data. The prevalence of malaria was higher among pregnant women (55%) than non-pregnant women (20%). Anaemia was significantly more prevalent among pregnant women than non-pregnant women and also more prevalent in pregnant women with malaria than non-pregnant women with malaria.

Introduction Many researchers consider malaria to be an endemic disease in the Republic of Yemen. Plasmodium falciparum is the predominant causative agent of malaria in this country [1–5].

Malaria infection due to P. falciparum has been widely recognized as associated with important adverse consequences in pregnant women [6] and malaria during pregnancy can have severe consequences for both the mother and the fetus [7]. Pregnancy has been observed to be an important risk factor for mortality among female malaria patients [8].

It is recognized that anaemia can be associated with pregnancy and is aggravated by malaria infection [9–11]. Diagne et al. found that the incidence of malaria attacks was on average 4.2 times higher during pregnancy than during the control period [12]. In areas
endemic for malaria, pregnant women frequently present with a placenta that has been infected by *P. falciparum*, an infection associated with a reduction in birthweight of the offspring [13]. Pregnant women are highly susceptible to malarial infection, resulting in maternal anaemia and low birthweight (LBW) infants [14].

Many other authors have confirmed that placental malaria increases the risk of delivery of an LBW infant and that this potentially increases the risk of perinatal and infant mortality [15–19]. Moreover Matteelli et al. found that women with active placental malaria infection are more likely to have babies of LBW (15.5%) than those with past chronic infection (1.4%) or no infection (1.5%) [20]. Furthermore, malaria has a considerably greater socioeconomic impact than other common diseases, especially with regard to a woman’s household commitments and work [21].

Therefore, we aimed to determine the prevalence of malaria among pregnant and non-pregnant women and assess the impact of malaria on the prevalence and severity of anaemia among pregnant and non-pregnant women. Furthermore, the impact of pregnancy on the prevalence and severity of anaemia among those infected with malaria and non-infected women was measured and the clinical manifestations of malaria among pregnant and non-pregnant women were compared.

**Methods**

A cross-sectional descriptive and comparative study was conducted in Hodiedah, Republic of Yemen.

Sample size was calculated using *Epi-info* version 6.02. Thus 500 women of reproductive age were enrolled in the study. Of these, 260 women were pregnant and 240 were not pregnant. A multistage sampling technique was used to select the calculated sample. The city of Hodiedah was operationally divided into four zones, each zone was divided into sectors and one sector from each zone was randomly selected. Each randomly selected sector was divided into several streets, from which two streets were randomly selected. From each street we selected an approximately equal number of pregnant and non-pregnant women. Informed consent was obtained from every woman included in our study.

For data collection purposes, a questionnaire was used for gathering personal data and a clinical examination, including inspection of the skin and sclera for discoloration and spleen palpation, was performed. The following laboratory investigations were also performed.

- Microscopic examination of thick and thin blood film for malaria was carried out.
- Blood was obtained using a finger stick and stained with Giemsa.
- Haemoglobin was determined using a colorimetric assay.
- For malaria positive cases: liver function tests were performed. Using a kinetic method, the cut-off for aspartate aminotransferase was 38 U/L and for alanine aminotransferase it was 40 U/L. A colorimetric assay was used for determination of bilirubin.
- Urine was tested for proteinuria using a dipstick.
- Disposable lancets and syringes were used for collecting blood samples and sterile containers were used to collect urine for analysis.

*SPSS* was used for data entry and analysis.
Our study included 500 women, all of whom were of reproductive age. The mean age of our sample was 25.53 ± 6.81 years with an age range of 15–45 years. Of the 500 women, 260 were pregnant and 240 women were not. The age distribution of pregnant and non-pregnant women is given in Table 1. Distribution of pregnant women according to the number of pregnancies is given in Table 2.

### Table 1 Age distribution among the pregnant and non-pregnant women

<table>
<thead>
<tr>
<th>Age (years)</th>
<th>Pregnant</th>
<th>Non-pregnant</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>No.</td>
<td>%</td>
<td>No.</td>
</tr>
<tr>
<td>£ 20</td>
<td>78</td>
<td>30</td>
<td>77</td>
</tr>
<tr>
<td>21–30</td>
<td>128</td>
<td>49.2</td>
<td>117</td>
</tr>
<tr>
<td>31–40</td>
<td>47</td>
<td>18.1</td>
<td>40</td>
</tr>
<tr>
<td>≥ 41</td>
<td>7</td>
<td>2.7</td>
<td>6</td>
</tr>
<tr>
<td>Total</td>
<td>260</td>
<td>100</td>
<td>240</td>
</tr>
</tbody>
</table>

As regards malaria, 191/500 (38.2%) women were infected with malaria parasites. Of the 191 cases of malaria, 177 were caused by *P. falciparum* (92.7%), 13 were caused by *P. vivax* (6.8%) and only 1 case was due to *P. malariae* (0.5%).

### Table 2 Distribution of pregnant women according to the number of pregnancies

<table>
<thead>
<tr>
<th>Number of pregnancies</th>
<th>No.</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>1–2</td>
<td>65</td>
<td>25</td>
</tr>
<tr>
<td>3–4</td>
<td>75</td>
<td>28.8</td>
</tr>
<tr>
<td>5–6</td>
<td>72</td>
<td>27.7</td>
</tr>
<tr>
<td>≥ 7</td>
<td>48</td>
<td>18.5</td>
</tr>
<tr>
<td>Total</td>
<td>260</td>
<td>100</td>
</tr>
</tbody>
</table>

The rate of infection was higher among younger age groups for both pregnant and non-pregnant women. Also, the rate of infection was higher among pregnant than non-pregnant women in all age groups (Figure 1). Overall, the rate of infection was 55% and 20% among pregnant and non-pregnant women respectively.

Of the 191 malaria-infected women, 107 (56%) had enlarged spleens, 59% for pregnant women and 52% for non-pregnant women. The infection rate was higher among primigravidae than among multigravidae, while frequency of enlarged spleen was higher among multigravidae (Figure 2). Among pregnant women the infection rate was higher during the third trimester than in the first and second trimesters, while the prevalence of enlarged spleen was higher during the first trimester than during the second and third (Table 3). More than two-thirds of the malaria cases with enlarged spleen had first and second degree spleen enlargement (34.6% and 38.3% respectively), while only 19.6% and 7.7% had third and fourth degree enlargement. The average spleen enlargement was 2.2.

### Table 3 Infection rate and prevalence of enlarged spleen among pregnant women according to trimester (n = 260)

<table>
<thead>
<tr>
<th>Trimester</th>
<th>No of women</th>
<th>Infection rate (%)</th>
<th>Prevalence of enlarged spleen (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>First</td>
<td>110</td>
<td>38.2</td>
<td>85.7</td>
</tr>
<tr>
<td>Second</td>
<td>85</td>
<td>51.8</td>
<td>68.2</td>
</tr>
</tbody>
</table>
Studying anaemia among our sample, we found that the mean value of haemoglobin (Hb) was 10.769 g/dL, the median was 10.600 g/dL with standard deviation = 2.642. The lowest value was 5.5 g/dL and the maximum value was 15.9 g/dL. Pregnant women were more susceptible to anaemia than non-pregnant women and the mean Hb level was 10.071 g/dL and 11.505 g/dL among the pregnant and the non-pregnant respectively. To determine the impact of malaria infection on Hb level, we compared the level between infected and non-infected pregnant women (Table 4) and found the Hb level was significantly lower in the infected pregnant women than in the non-infected pregnant women. Some symptoms of malaria infection were equally prevalent among pregnant and non-pregnant women, whereas others were more prevalent among pregnant women (Table 5). Also, during clinical inspection of the skin and sclera, pallor and jaundice were two times higher among infected pregnant women than among infected non-pregnant women (Table 5).

In many tropical and subtropical countries malaria can manifest as gastrointestinal tract (GIT) disorders. We found that among pregnant women with malaria, 54 of 143 (37.8%) suffered from GIT disorders, while among non-pregnant women with malaria only 8 of 48 cases (16.7%) had symptoms of GIT disorders. Nausea was the most common GIT disorder among pregnant women infected with malaria, while among non-pregnant women infected with malaria diarrhoea was the most predominant GIT disorder.

Every malaria case in our sample was investigated for liver function and proteinuria (Figure 3). It was clear that liver function disorders and proteinuria were higher among infected pregnant than infected non-pregnant women. We repeated these investigations after one week and at that time they were within normal values; normalization of these investigations means that these disorders among our cases were transitory.

| Table 5 Frequency of some malaria signs and symptoms among pregnant and non-pregnant women |
|-----------------------------------------------|----------------|----------------|
| **Sign/symptom**                             | **Frequency (%)** |                |
|                                              | Pregnant (n = 143) | Not pregnant (n = 48) |
| Headache                                     | 90              | 90             |
| Fever                                        | 84.5            | 85.4           |
| Shivering                                    | 68.3            | 58.3           |
| Sweating                                     | 75.4            | 50             |
| Fatigue                                      | 61.3            | 50             |
| Malaise                                      | 57.7            | 37.5           |
| Gastrointestinal disorders                   |                 |                |
| Pallor                                       | 41.6            | 20             |
| Jaundice                                     | 10.6            | 5              |

**Discussion**

The prevalence of malaria among pregnant women was higher than among non-pregnant women. The relative risk was 4.889, indicating that pregnant women are at an almost five times greater risk of malaria than non-pregnant women. Statistical analysis found a
highly significant statistical difference ($\chi^2 = 64.76, P < 0.001$). In this regard our findings are similar to findings of other researchers. For example, Diagne et al. found that the incidence rate of malaria attacks was on average 4.2 times higher during pregnancy than during the non-pregnant period [12]. Other authors have also found that pregnant women are highly susceptible to malaria infection compared to non-pregnant women [14]. Furthermore, the primigravidae were at a 1.5 times greater risk of getting malaria infection than the multigravidae (Figure 2). This finding agrees with the findings of Shulman, Graham and Jilo [22], but contradicts the Diagne et al. study [12], which reported a significant increase in the risk of malaria among the multigravidae.

\emph{P. falciparum} was the predominant causitive agent of malaria in our sample; this finding is similar to the findings of other studies conducted in the Republic of Yemen [1–4].

The mean Hb level was lower among pregnant woman than among non-pregnant women ($P < 0.001$; \(t\)-test = 6.293). Our findings in this regard were similar to the findings of Thomson who reported that 41.5\% of pregnant women in Namibia were found to be anaemic (Hb < 11 g/dL). In our study, 53.5\% of the pregnant women were anaemic, while only 25.0\% of the non-pregnant women were anaemic (Hb less < 11 g/dL). Therefore anaemia was more prevalent among pregnant women than among non-pregnant women (relative risk = 2.14). Moreover, the Hb level was lower among malaria-infected pregnant women than among malaria-infected non-pregnant women ($P < 0.001$; \(t\)-test = 18.169). Our findings are similar to many other studies [8,9,11,23–26].

To conclude, our study showed that the prevalence of malaria was higher among pregnant than non-pregnant women. Also anaemia was more prevalent among infected pregnant women than among non-infected pregnant women.

\textbf{Acknowledgements}

We would like to express deep thanks to Dr A.A. Kudaish, Dr F.A. Al-Kersh, Dr Y.A. Hurab and Dr A.S. al-Ahdal for their helpful efforts and participation in the process of data collection. Also we extend deep thanks and great appreciation to Dr Y.A. Rajaa for his assistance in data analysis.

\textbf{References}


Consanguineous marriage is traditionally common throughout the Eastern Mediterranean region, especially in the mainly Muslim countries. To date, there is little information on consanguinity in Yemen. The aim of this study was to ascertain the rate of consanguineous marriage and average coefficient of inbreeding in Sana’a City, Yemen. A population survey was conducted with the intention of covering married couples resident in Sana’a City by means of a multi-stage random sampling technique. A total of 1050 wives and husbands were interviewed on consanguinity in their households. The total incidence of consanguinity was 44.7% (95% CI 41.7-47.7%) with first-cousin marriages constituting 71.6% of the total consanguineous marriages and 32% of all marriages. Paternal parallel first cousins (Type I) accounted for 49% of first-cousin marriages. The average coefficient of inbreeding (F) was 0.02442. The incidence of consanguinity is relatively high in Yemen with predominantly first-cousin marriage. This might be related to the deeply rooted social and cultural beliefs in the country.