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Iwona Omelańczuk¹, Ewa Pisula²

Psychometric properties of the Polish version of the Autism Spectrum Quotient: Children's Version

Właściwości psychometryczne polskiej wersji językowej Autism Spectrum Quotient: Children's Version (AQ-Child)

¹ Institute of Psychology, The Maria Grzegorzewska University, Warsaw, Poland

² Faculty of Psychology, University of Warsaw, Warsaw, Poland

Correspondence: Iwona Omelańczuk, Institute of Psychology, The Maria Grzegorzewska University, Szczęśliwicka 40, 02-353 Warsaw, Poland, e-mail: iomelanczuk@aps.edu.pl

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ORCID iDs

1. Iwona Omelańczuk <https://orcid.org/0000-0001-8543-7399>

2. Ewa Pisula <https://orcid.org/0000-0002-7458-5043>

Abstract

Introduction and objective: Early diagnosis of developmental disorders in children can help initiate interventions to support development and improve mental health and well-being for both parents and children. Autism spectrum disorder is among the developmental disorders with the latest diagnosis. Screening procedures using validated tools may be important for early identification of autism spectrum disorder. The purpose of the present study was to verify the psychometric properties of the Polish version of one such tool, the Autism Spectrum Quotient: Children's Version. **Materials and methods:** The study included 192 children aged 4 to 11 years diagnosed with autism spectrum disorder (all had a formal psychiatric diagnosis of childhood autism, Asperger syndrome, or atypical autism based on ICD-10 criteria), with normal intellectual functioning, and 520 typically developing children of the same age range. **Results:** The reliability and validity of the Polish version of the Autism Spectrum Quotient: Children's Version are adequate. A cut-off score of ≥ 67 showed high sensitivity and specificity, and was optimal for distinguishing between the study groups. **Conclusions:** The Autism Spectrum Quotient: Children's Version in Polish version makes it possible to detect symptoms of autism spectrum disorder in clinical samples, and may be a useful tool for researching autistic traits in the general population.

Keywords: Autism Spectrum Quotient: Children's Version, AQ-Child, Polish AQ-Child

Streszczenie

Wprowadzenie i cel: Wczesne wykrycie zaburzeń w rozwoju u dzieci pozwala na wdrożenie interwencji wspierających ich rozwój, jak również zdrowie psychiczne i dobrostan zarówno dzieci, jak i ich rodziców. Zaburzenie ze spektrum autyzmu należy do najpóźniej rozpoznawanych zaburzeń w rozwoju. Istotną rolę w procesie wczesnego rozpoznawania tego zaburzenia odgrywają procedury przesiewowe z wykorzystaniem zwalidowanych narzędzi, takich jak Autism Spectrum Quotient w wersji dla dzieci. Prezentowane badanie miało na celu zweryfikowanie właściwości psychometrycznych polskiej wersji językowej tego narzędzia. **Materiał i metody:** Badaniem objęto 192 dzieci w wieku 4–11 lat z rozpoznaniem odpowiadającym diagnozie zaburzenia ze spektrum autyzmu (wszystkie dzieci miały ustalone rozpoznanie autyzmu dziecięcego, zespołu Aspergera lub autyzmu atypowego na podstawie kryteriów diagnostycznych zawartych w klasyfikacji ICD-10), w normie intelektualnej oraz 520 dzieci rozwijających się typowo w tym samym wieku. **Wyniki:** Rzetelność i trafność polskiej wersji językowej narzędzia Autism Spectrum Quotient w wersji dla dzieci została potwierdzona. Wynik ≥ 67 punktów wykazał wysoką czułość i swoistość oraz okazał się optymalnym punktem pozwalającym na rozróżnienie pomiędzy badanymi grupami. **Wnioski:** Kwestionariusz Autism Spectrum Quotient w wersji dla dzieci w polskiej wersji językowej umożliwia wykrycie obecności objawów zaburzenia ze spektrum autyzmu w próbie klinicznej i może być użytecznym narzędziem do badania cech autystycznych w populacji ogólnej.

Słowa kluczowe: Autism Spectrum Quotient – wersja dla dzieci, AQ-Child, AQ-Child – polska wersja językowa

INTRODUCTION

According to the Global Burden of Disease data, in 2010 the number of people diagnosed with autism spectrum disorder¹ worldwide was approximately 52 million (Baxter et al., 2015). As reported by the Centers for Disease Control and Prevention (Maenner et al., 2023), the prevalence of autism among school-aged children is 1 in 36, and in children under 5 years of age autism is the most common cause of disability (Baxter et al., 2015).

Diagnosis of autism spectrum disorder is based on the presence of clinical symptoms that include deficits in social communication and repetitive, restricted patterns of behaviour and interests (American Psychiatric Association, 2013). Due to individual differences in the expression of developmental difficulties and frequent comorbidities, autism spectrum disorder tends to be diagnosed relatively late (Shattuck et al., 2009). A method to lower the age of diagnosis may involve implementing screening procedures using validated tools (Petrocchi et al., 2020). One such instrument is the Autism Spectrum Quotient: Children's Version (AQ-Child) (Auyeung et al., 2008), which is a version of the Autism Spectrum Quotient (AQ) (Baron-Cohen et al., 2001) adapted for children aged 4–11 years. The AQ-Child is a questionnaire completed by the child's parents/caregivers, consisting of 50 items that make up five scales: Social Skills, Attention Switching, Attention to Detail, Communication, and Imagination.

The AQ-Child is free and easy to use. It has been translated into twenty languages² and demonstrates good psychometric properties, with high sensitivity and specificity values across cultures and communities (Carruthers et al., 2018). Research on the original English version (Auyeung et al., 2008), as well as on the Japanese (Wakabayashi et al., 2007), Malay (Hashim et al., 2021), Chinese (Sun et al., 2018) or Hindi and Bengali (Rudra et al., 2014) versions, showed that autistic children scored higher than their neurotypical peers both on the AQ-Child Total Score and on individual subscales. While neurotypical boys score higher than girls, there are no gender differences among autistic children. The scale's reliability, measured by Cronbach's α coefficient, is high across all language versions. The English version (as well as the Malay and Chinese versions) uses a 4-point response scale (from 0 to 3), as opposed to the dichotomous (yes vs. no) scale in the Japanese version, which affects cut-off scores: the cut-off proposed by Auyeung et al. (2008) is ≥ 76 versus ≥ 25 proposed by Wakabayashi et al. (2007).

¹ The term "autism spectrum disorder" is to be understood as defined in DSM-5 (American Psychiatric Association, 2013) and ICD-11 (World Health Organization, 2018), and as an umbrella term for such pervasive developmental disorders listed in ICD-10 (World Health Organization, 1992) as childhood autism, Asperger syndrome, and atypical autism.

² <https://www.autismresearchcentre.com/tests/autism-spectrum-quotient-aq-child/>

This paper presents the results of the validation of the Polish-language version of the Autism Spectrum Quotient: Children's Version. Given the limited availability of reliable screening tools for autism spectrum disorder in Poland, this study may provide valuable insights for local diagnosticians, as well as useful data for further research on autism screening measures used worldwide.

MATERIALS AND METHODS

Preparation of the AQ-Child Polish version

The translation of the AQ-Child was conducted according to the back-translation procedure (Hambleton et al., 2005). The Polish version of the AQ-Child has the same layout as the original.

The AQ-Child consists of five subscales (each including ten items): Social Skills (ability to establish and maintain contacts; items 1, 11, 13, 15, 22, 36, 44, 45, 47, 48), Attention Switching (ability to quickly shift the focus of attention; items 2, 4, 10, 16, 25, 32, 34, 37, 43, 46), Attention to Detail (ability to notice details, perceive repeating patterns, and tendency to collect information in specific areas; items 5, 6, 9, 12, 19, 23, 28, 29, 30, 49), Communication (ability to effectively communicate verbally and non-verbally; items 7, 17, 18, 26, 27, 31, 33, 35, 38, 39), and Imagination (imagination skills and ability to mentalise; items 3, 8, 14, 20, 21, 24, 40, 41, 42, 50). Responses are scored on a 4-point Likert scale (0–3 points), as in the original version of the questionnaire (Auyeung et al., 2008). For half of the items, 0 points represents "definitely agree", 1 point – "slightly agree", 2 points – "slightly disagree", 3 points – "definitely disagree". For the other half, scoring is reversed, with 0 points representing

Variables	Autistic Group (n = 192)	Non-autistic Group (n = 520)
Child's sex		
Female	n = 33	n = 289
Male	n = 159	n = 229
No data	n = 0	n = 2
Child's age	M = 7.29 (SD = 1.95)	M = 7.46 (SD = 1.48)
Child's diagnosis		
Childhood autism	n = 93	n/a
Asperger syndrome	n = 75	n/a
Atypical autism	n = 24	n/a
Parent's sex		
Female	n = 164	n = 445
Male	n = 17	n = 72
No data	n = 11	n = 3
Parent's age	M = 37.67 (SD = 5.81)	M = 36.91 (SD = 5.84)
Parent's education		
Primary	n = 3 (1.6%)	n = 9 (1.7%)
Vocational	n = 14 (7.3%)	n = 28 (5.4%)
Secondary	n = 62 (32.3%)	n = 140 (26.9%)
High	n = 98 (51%)	n = 335 (65.5%)
No data	n = 15 (7.8%)	n = 8 (0.5%)

Tab. 1. Demographic information

Item AQ-Child	Subdomain	Autistic Group	Non-autistic Group	Mann-Whitney U
1	S	1.38	0.78	68,533.5***
2	AS	2.1	1.61	67,125***
3	I	1.24	0.57	71,737***
4	AS	2.41	2.10	60,455.5***
5	AD	2.04	1.68	61,111***
6	AD	1.82	1.80	51,137
7	C	1.65	0.55	78,879***
8	I	1.35	0.56	75,037.5***
9	AD	1.21	1.52	38,404***
10	AS	1.92	1.13	74,514***
11	S	1.2	0.47	75,083***
12	AD	2.28	1.95	61,875.5***
13	S	0.89	0.65	56,646**
14	I	1.3	0.94	59,936***
15	S	1.83	1.20	71,168***
16	AS	2.28	1.90	63,497.5***
17	C	1.79	0.71	80,249***
18	C	1.87	1.63	58,673***
19	AD	1.68	1.36	58,656.5***
20	I	1.79	0.82	79,533.5***
21	I	1.31	0.92	62,323***
22	S	1.68	1.35	58,673***
23	AD	1.57	1.28	58,178.5***
24	I	1.22	0.83	61,633***
25	AS	1.74	1.10	68,211***
26	C	1.90	0.75	81,862.5***
27	C	2.16	1.20	79,806***
28	AD	1.90	1.52	63,602***
29	AD	1.72	1.71	50,596
30	AD	1.93	1.99	48,539
31	C	2.18	1.34	76,860.5***
32	AS	1.31	0.71	68,040***
33	C	1.82	0.86	75,546.5***
34	AS	1.34	0.70	69,263***
35	C	1.90	0.88	79,174***
36	S	1.85	0.95	75,806***
37	AS	1.26	0.88	62,911***
38	C	1.98	0.65	85,826***
39	C	1.77	0.96	73,818***
40	I	1.75	0.96	71,739***
41	I	1.85	1.77	53,212
42	I	1.78	1.07	72,048.5***
43	AS	1.53	1.52	50,532.5
44	S	1.26	0.38	76,417.5***
45	S	2.11	1.09	81,143.5***
46	AS	2.01	1.39	69,227.5***
47	S	1.26	0.69	67,376***
48	S	1.91	0.90	79,188.5***
49	AD	1.53	1.61	48,009.5
50	I	1.63	0.70	77,207.5***

AD – Attention to Detail; AS – Attention Switching; C – Communication; I – Imagination; S – Social Skills.

* $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$.

Tab. 2. Item analysis – mean scores for each item by group

“definitely disagree” and 3 points – “definitely agree”. The AQ-Child Total Score is the sum of points scored in all items of the measure. More “autistic-like” behaviour is reflected by higher scores, where the lowest AQ-Child score (0) indicates no autistic traits, and the maximum score (150) indicates highest scores on all autistic items.

Participants

The study involved two groups of participants aged 4–11 years: the Autistic Group and the Non-autistic Group consisting of typically developing children (demographic details are presented in Tab. 1). All children in the Autistic Group had a formal psychiatric diagnosis of childhood autism or Asperger syndrome, or atypical autism based on ICD-10 criteria (World Health Organization, 1992), independently from this study. None of the children were diagnosed with intellectual disabilities or other comorbidities.

Procedure

All participants were recruited from mainstream, inclusive, or autism-specific kindergartens and schools across various regions of Poland. The parents of children in the Autistic Group and Non-autistic Group were invited to take part in the study through teachers who provided those interested in participation with files containing a letter informing about the study, a demographics survey, and the Polish version of the AQ-Child questionnaire.

The study was approved by the Ethics Committee of the University of Warsaw, Faculty of Psychology.

Missing answers and outliers

Only the children for whom the AQ-Child Polish version was fully completed were included in the analysis ($N = 712$). A total of 80 questionnaires were excluded from the overall pool due to missing data. All analyses were conducted using SPSS 29.

RESULTS

Item analysis

The mean scores for individual items by study group are shown in Tab. 2.

The Mann–Whitney U test was used to compare the two groups on each Polish AQ-Child item. No differences between the Autistic Group and the Non-autistic Group mean scores were found in items 6, 29, 30, 41, 43 and 49, while in item 9 the mean score was higher in the Non-autistic Group than in the Autistic Group. Nevertheless, all items were included in further analyses, consistent with the original AQ-Child procedure.

Internal consistency for the Polish AQ-Child (50 items)

Cronbach's α coefficients were calculated for the two groups together: total score $\alpha = 0.92$, Social Skills $\alpha = 0.83$, Attention to Detail $\alpha = 0.78$, Attention Switching $\alpha = 0.70$, Communication $\alpha = 0.85$, Imagination $\alpha = 0.78$, and for each of the two groups (Autistic Group and Non-autistic Group) separately: total score $\alpha = 0.92/0.81$, Social Skills $\alpha = 0.85/0.70$, Attention to Detail $\alpha = 0.80/0.78$, Attention Switching $\alpha = 0.76/0.49$, Communication $\alpha = 0.77/0.70$, Imagination $\alpha = 0.78/0.60$, respectively.

Group and sex differences

A two-factor analysis of variance (Group x Sex) was conducted to compare the Autistic and the Non-autistic Groups, as well as boys and girls in each group, in terms of the total score and subscale scores. Relevant descriptive statistics are provided in Tab. 3. In the case of the total score, the main effect of Group was found ($F(1, 706) = 259.54, p < 0.001, \eta^2 = 0.269$). The main effect of Group was also observed for the following subscales: Social Skills ($F(1, 706) = 195.1; p < 0.001, \eta^2 = 0.217$), Communication ($F(1, 706) = 424.2; p < 0.001; \eta^2 = 0.375$), and Imagination ($F(1, 706) = 134; p < 0.001; \eta^2 = 0.160$). The Autistic Group scored higher than the Non-autistic Group both on the total score and the subscales mentioned.

The main effect of Sex on the total score was also significant ($F(1, 706) = 29.5; p < 0.001; \eta^2 = 0.04$). There were also main effects of Sex for the following subscales: Social Skills ($F(1, 706) = 8.9, p < 0.01; \eta^2 = 0.012$), Attention to Detail ($F(1, 706) = 20.1; p < 0.001; \eta^2 = 0.028$), Communication ($F(1, 706) = 9.4; p < 0.01; \eta^2 = 0.013$), and Imagination ($F(1, 706) = 31.6; p < 0.001; \eta^2 = 0.043$). In all these cases, boys scored significantly higher than girls.

There was one effect of interaction Group by Sex, for the subscale Attention to Detail ($F(1, 706) = 12.1; p < 0.01$;

Group	AQ-Child total	Social Skills	Attention to Detail	Attention Switching	Communication	Imagination
Autistic	86.2 (21.4)	15.7 (6.0)	17.6 (5.7)	14.3 (7.7)	19.4 (5.4)	15.3 (5.5)
Autistic girls	75.9 (19.2)	14.2 (5.7)	14.2 (4.9)	14.0 (7.5)	18.2 (5.4)	12.4 (4.9)
Autistic boys	88.3 (21.3)	16.0 (6.0)	18.3 (5.6)	14.4 (7.8)	19.7 (5.4)	15.9 (5.4)
Non-autistic	56.6 (12.1)	8.5 (3.8)	16.4 (4.7)	12.7 (3.8)	9.6 (3.9)	9.1 (3.5)
Non-autistic girls	54.5 (11.5)	8.0 (3.6)	16.1 (4.5)	12.4 (4.0)	9.0 (3.5)	8.5 (3.5)
Non-autistic boys	59.1 (12.4)	9.0 (3.9)	16.7 (4.9)	13.0 (3.6)	10.2 (4.2)	9.9 (3.5)

Tab. 3. Mean scores (and SDs) of total score and subscales of the Polish version of the AQ-Child by group and sex

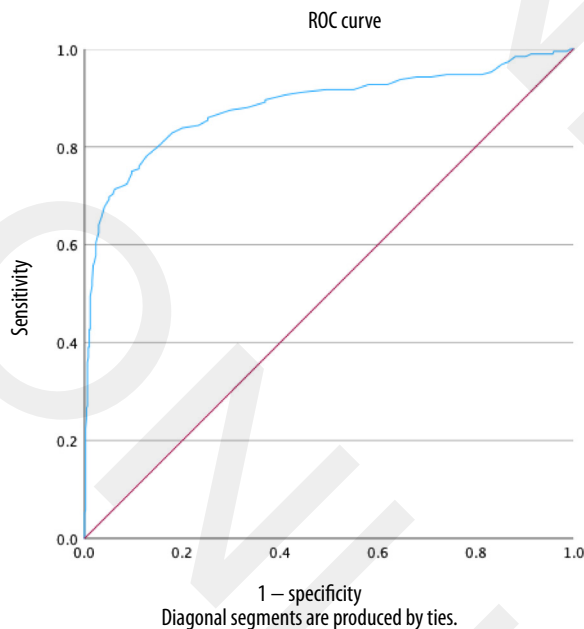


Fig. 1. The receiver operating characteristic (ROC) curve

$\eta^2 = 0.017$). Boys from the Autistic Group scored significantly higher than boys from the Non-autistic Group, whereas girls from the Autistic Group scored significantly lower than girls from the Non-autistic Group.

Cut-off score for the Polish AQ-Child

The range of total Polish AQ-Child scores in the Autistic Group was 30–138 points vs. 22–116 points in the Non-autistic Group. To determine cut-off points with optimal parameters to distinguish between the groups with as many true positives and as few false positives as possible, a receiver operating characteristic (ROC) curve analysis was conducted. The ROC analysis showed that a score of 67 provides both high sensitivity (0.80) and high specificity (0.85). A score of 67 or more points was observed in 80.2% of participants in the Autistic Group, compared to 15.2% the Non-autistic Group. Fig. 1 shows the ROC curve.

DISCUSSION

Given the high prevalence of autism in children (Maenner et al., 2023) and the critical importance of early diagnosis for the child's and parental functioning and well-being (Okoye et al., 2023), there is an unmet need for screening instruments to identify candidates for specialist diagnostics. Such reliable tools are still lacking in Poland, which is why this study examined the psychometric properties of the Polish version of the AQ-Child. As was the case with the original version of the AQ-Child (Auyeung et al., 2008), the Polish version was found to have good psychometric properties. Cronbach's α coefficients for the total score were 0.92 for the Autistic Group and 0.81 for the Non-autistic Group, confirming the questionnaire's high reliability. Similarly,

most of the five domains of the Polish AQ-Child showed relatively strong reliability as measured with Cronbach's α coefficients in the Autistic Group, and slightly lower reliability in the Non-autistic Group (especially with respect to Attention Switching and Imagination).

Comparisons between the Autistic and Non-autistic Groups showed that children with autism scored significantly higher than neurotypical children on total score and on the three subscales: Social Skills, Communication, and Imagination. Sex differences were found in the total score and most subscales (Social Skills, Attention to Detail, Communication and Imagination), with boys scoring higher than girls. There was only one effect of interaction Group by Sex: boys in the Autistic Group scored significantly higher than boys in the Non-autistic Group on Attention to Detail, whereas girls in the Autistic Group scored significantly lower on this subscale than girls in the Non-autistic Group.

These findings were consistent with expectations, confirming the validity of the Polish version of the AQ-Child. The pattern of differences is the same as in the studies on the original AQ-Child version: children with autism score higher in the questionnaire than children without this diagnosis, and boys score higher than girls (Auyeung et al., 2008; Wakabayashi et al., 2007).

The cut-off point of ≥ 67 for the Polish AQ-Child showed high sensitivity (0.80) and specificity (0.85), with 80.2% of participants in the Autistic Group scoring ≥ 67 points compared to 15.2% in the Non-autistic Group.

CONCLUSIONS

In summary, the Polish AQ-Child appears to be a useful screening tool for autism, especially taking into account the total score. The questionnaire makes it possible to detect the presence of symptoms of autism in clinical samples, and may serve as a valuable instrument for researching autistic traits in the general population. However, it should be emphasised that it cannot be a substitute for a clinical diagnosis. In addition, the factorial structure of the instrument and its subscales require further research.

Conflict of interest

The authors do not report any financial or personal connections with other persons or organisations which might negatively affect the content of this publication and/or claim authorship rights to this publication.

Author contribution

Original concept of study; collection, recording and/or compilation of data; analysis and interpretation of data; writing of manuscript; critical review of manuscript; final approval of manuscript: IO, EP.

References

- American Psychiatric Association: Diagnostic and Statistical Manual of Mental Disorders. DSM-5. American Psychiatric Association, Arlington 2013.
- Auyeung B, Baron-Cohen S, Wheelwright S et al.: The Autism Spectrum Quotient: Children's Version (AQ-Child). *J Autism Dev Disord* 2008; 38: 1230–1240.
- Baron-Cohen S, Wheelwright S, Skinner R et al.: The Autism-Spectrum Quotient (AQ): evidence from Asperger syndrome/high-functioning autism, males and females, scientists and mathematicians. *J Autism Dev Disord* 2001; 31: 5–17.
- Baxter AJ, Brugha TS, Erskine HE et al.: The epidemiology and global burden of autism spectrum disorders. *Psychol Med* 2015; 45: 601–613.
- Carruthers S, Kinnaird E, Rudra A et al.: A cross-cultural study of autistic traits across India, Japan and the UK. *Mol Autism* 2018; 9: 1–10.
- Hambleton RK, Merenda PF, Spielberger CD (eds.): *Adapting Educational and Psychological Tests for Cross-Cultural Assessment*. Lawrence Erlbaum Associates, London 2005.
- Hashmi SI, Ah Gang GC, Sombuling A et al.: Psychometric properties and factor structure of the Malay autism spectrum quotient: children's version. *Malays J Med Sci* 2021; 28: 108–120.
- Maenner MJ, Warren Z, Williams AR et al.: Prevalence and characteristics of autism spectrum disorder among children aged 8 years – Autism and Developmental Disabilities Monitoring Network, 11 sites, United States, 2020. *MMWR Surveill Summ* 2023; 72: 1–14.
- Okoye C, Obialo-Ibeawuchi CM, Obajeun OA et al.: Early diagnosis of autism spectrum disorder: a review and analysis of the risks and benefits. *Cureus* 2023; 15: e43226.
- Petrocchi S, Levante A, Lecciso F: Systematic review of level 1 and level 2 screening tools for autism spectrum disorders in toddlers. *Brain Sci* 2020; 10: 1–32.
- Rudra A, Banerjee S, Singhal N et al.: Translation and usability of autism screening and diagnostic tools for autism spectrum conditions in India. *Autism Res* 2014; 7: 598–607.
- Shattuck PT, Durkin M, Maenner M et al.: Timing of identification among children with an autism spectrum disorder: findings from a population-based surveillance study. *J Am Acad Child Adolesc Psychiatry* 2009; 48: 474–483.
- Sun F, Dai M, Lin L et al.: Psychometric properties of the Chinese version of Autism Spectrum Quotient-Children's Version: a sex-specific analysis. *Autism Res* 2019; 12: 303–315.
- Wakabayashi A, Baron-Cohen S, Uchiyama T et al.: The Autism-Spectrum Quotient (AQ) Children's Version in Japan: a cross-cultural comparison. *J Autism Dev Disord* 2007; 37: 491–500.
- World Health Organization: *International Classification of Diseases for Mortality and Morbidity Statistics (11th Revision)*. World Health Organization, Geneva 2018.
- World Health Organization: *The ICD-10 Classification of Mental and Behavioural Disorders: Clinical Descriptions and Diagnostic Guidelines*. World Health Organization, Geneva 1992.