



Vulnerable pregnant women in antenatal practice: Caregiver's perception of workload, associated burden and agreement with objective caseload, and the influence of a structured organisation of antenatal risk management

Nynke de Groot, MSc (Researcher)^{a,*}, Angélica A. Venekamp, MSc (Research Associate)^b,
 Hanneke W. Torij, MSc (Associate Professor Midwifery & Childbirth)^b,
 Mijke P. Lambregtse-Van den Berg, MD, PhD (Psychiatrist and Child- and Youth
 Psychiatrist)^c,
 Gouke J. Bonssel, MD, PhD, MPH (Professor in Perinatal Care and Public Health)^a

^a Department of Obstetrics and Gynecology, Division of Obstetrics & Prenatal Medicine, University Medical Centre Rotterdam, P.O. Box 2040, 3000 CA Rotterdam, The Netherlands

^b Rotterdam University of Applied Science, Center of Expertise Innovations in Care, P.O. Box 25035, 3001 HA Rotterdam, The Netherlands

^c Department of Psychiatry, University Medical Centre Rotterdam, P.O. Box 2040, 3000 CA Rotterdam, The Netherlands

ARTICLE INFO

Article history:

Received 8 February 2016

Received in revised form

16 June 2016

Accepted 3 July 2016

Keywords:

Vulnerable populations

Pregnancy

Midwifery

Obstetrics

Antenatal screening

Risk assessment

ABSTRACT

Introduction: pregnancy care for vulnerable women is often perceived as a burden by caregivers as vulnerable clients require complex case management, additional time, and more often show adverse perinatal outcomes. Vulnerable clients bring about additional work strain for the caregiver, especially when the workload is high. We define client vulnerability as coexistence of psychopathology, psychosocial problems or substance use, together with features of deprivation. We investigated, as part of a national programme, whether the subjective caregiver's perception of workload and the objective registry-based caseload of vulnerable clients are in agreement, and whether a structured organisation of antenatal risk management reduces the burden associated with the perceived workload, in particular if the objective caseload is high.

Methods: we combined three data sources: (1) at the unit level (i.e. midwifery practice, obstetric unit) interview data from caregivers, from which we derived a) the (subjective) caregiver's perception of workload, b) the associated burden and c) organisational structure of antenatal risk management, (2) at the unit level perinatal registry data, from which we derived a) unit characteristics and b) (objective) unit specific caseload, and (3) at the individual client level survey data collected during the first antenatal visit, from which the prevalence of vulnerable clients was derived. The study area was the South-West Netherlands (2.5 million inhabitants), containing areas with varying degrees of urbanisation and deprivation.

Findings: sixteen units had complete data on all measures. Generally, subjective workload and objective caseload were only weakly related, the relation being modified by the organisation of antenatal risk management. If the organisational structure of antenatal risk management was low, the experienced burden was high, even if the objective caseload was low. Highly structured antenatal risk management was associated with a medium to low burden.

Discussion: our observational study suggests that even a high caseload can be dealt with by structured antenatal risk management. A change from the current individual case-finding policies towards a more universal screen-like approach may thus benefit both the client and the caregiver.

© 2016 Elsevier Ltd. All rights reserved.

* Corresponding author.

E-mail addresses: n.degroot@erasmusmc.nl (N. de Groot),
a.a.venekamp@hr.nl (A.A. Venekamp), h.w.torij@hr.nl (H.W. Torij),
mijke.vandenberg@erasmusmc.nl (M.P. Lambregtse-Van den Berg),
g.bonsel@erasmusmc.nl (G.J. Bonssel).

Introduction

Vulnerability is increasingly recognised as key determinant of care processes and outcome (Grabovschi et al., 2013). We define

vulnerability as a dynamic concept; it reflects the personal susceptibility to adverse outcomes, in particular health and health-related outcomes, due to the presence of a reinforcing set of personal and environmental risks often related to deprivation. According to the World Health Organization (WHO), the decrease of vulnerability may be the foremost means to achieve Universal Health Coverage (UHC) in health care systems of developed and underdeveloped countries; this justifies prioritisation of health policies in charge of this decrease (Sridhar et al., 2015). This particularly applies to the care for pregnant women and newborns (UN Secretary-General, 2010; World Health Organization, 2008, 2015).

In perinatal care, vulnerability is a major factor in the development of inequalities in maternal and perinatal health (De Graaf et al., 2013a; National Institute of Clinical Excellence, 2014; Quispel et al., 2014). This is also true in developed countries such as the Netherlands. A 2010 report of the Dutch perinatal system showed unexpected high levels of mortality and morbidity as compared to European standards (EURO-PERISTAT Project et al., 2008). Additionally, impressive health inequalities exist between deprived and non-deprived areas, in particular in large cities (De Graaf et al., 2013b). Detailed analysis showed a considerable contribution of professional performance factors in this context (Bonsel et al., 2010; Stuurgroep Zwangerschap en Geboorte, 2011; Poeran et al., 2015). These findings were unexpected in view of the national prosperity and the well-developed care system, claimed to be equitable (Flood, 2010).

Several initiatives, among which national and regional programmes, were launched to improve outcomes in specific parts of The Netherlands. Professional organisations accepted co-responsibility in this regard (Denktaş et al., 2012). They emphasised a high workload and associated burden is involved in providing due care to vulnerable clients, in particular during the antenatal stage. Current reimbursement schemes do not provide incentives for extra preventive efforts nor addressing non-medical factors, both of which are experienced as barriers towards improvement (Poeran et al., 2012).

A nation-wide research programme instituted so-called regional consortia of professionals, academia and others, where each consortium defined its specific regional target. The Regional Perinatal Consortium South-West Netherlands (RPCSWN) in 2013 defined as its target the improvement of perinatal outcomes among the most vulnerable women (ZonMw, 2014). This regional prioritisation rested on the high regional prevalence of vulnerability-related adverse outcomes and the high experienced burden of care for vulnerable clients (Bonsel et al., 2010; De Graaf et al., 2013b; Quispel et al., 2012, 2014; Vos et al., 2014). This high prevalence relates to the presence of two adjacent, highly urbanised areas (the Rotterdam region, and Dordrecht city area). Frequently more consulting time was reported to be required, as were interventions by other medical specialists, social workers and preventive services: comorbidity treatment, household support regarding finance and occasionally domestic violence (Mejdoubi et al., 2015), educational arrangements in teenage pregnancies, STD treatment, and the reduction of tobacco, drug, and/or alcohol addiction.

The RPCSWN project empirically compared the subjective workload and the associated burden of care provision induced by vulnerable pregnant women. The perspective was the experience of the caregivers (midwifery practices, obstetric units in hospitals), while the caseload defined by objective client-derived criteria. With interview information from the caregivers we established the degree to which antenatal risk management was structured, e.g. by the routine use of checklists and standardized risk-protocols.

We hypothesised that a) higher urbanisation would be associated with a higher proportion of vulnerable clients. We further

hypothesised that b) the subjective caregiver's perception of workload as emerging from formal interview data with midwives and gynaecologists is in agreement with objective count data on vulnerable clients ('caseload'; medical record information) attending their practices; and c) that a highly structured organisation of antenatal risk-management reduces the experienced burden, in particular if the caseload is high. Standard checklist screening plus follow-up is a defining feature of a structured organisation.

Except for about 15% of women with high initial risk attending the gynaecologist, midwives are responsible for initial antenatal care in the Netherlands. Apart from some tests (early ultrasound, blood group typing, STD), history taking and risk assessment is not standardized and does not include routine consultation of a gynaecologist. This situation is at the core of the current debate on Dutch maternity care reform. If our hypothesis on burden reduction appeared true, this would add support to current experimental programmes, which introduce highly structured care right at the start of prenatal care (Vos et al., 2015a, 2015b).

Methods

General

This study is part of a large, governmentally funded regional study introducing structured care for vulnerable pregnant women within the region of the South-West Netherlands (about 80 midwifery practices and obstetric units). Part of the study design is the foundation of an intermediary organisation (RPCSWN, see below). The paper here combines, at the unit level, data from three sources: interview data from regional caregivers (2013–2015; for this paper restricted to caregivers from midwifery practices and obstetric units), perinatal registry data from Perined (The Netherlands Perinatal Registry) which is complete at the national level (The Netherlands Perinatal Registry, 2014), and survey data from a cohort of clients from each unit (2014–2015). Consequently we speak about units (midwifery practices and obstetric units) and clients as participants.

Vulnerability

Vulnerability is a concept used in the public domain and research, in the social, economic and medical sciences (Aday, 1994; Rogers, 1997; Gobbens et al., 2010; Poeran et al., 2013). In sociological and economic research traditions, the concept is typically defined at the aggregate (group, area) level; in the clinical and psychological domain, vulnerability is defined at the individual level ('risk factor'). Both levels contribute to adverse outcomes such as intra-uterine growth retardation (postnatally reflected as small-for-gestational-age) and stillbirth. Growth retardation (measured as SGA) is a strong co-factor in the occurrence of stillbirth and mortality during birth. For this reason both SGA and stillbirth have their own merits in perinatal inequality analysis.

To obtain an operational definition of vulnerability, we distinguish between two pathways to adverse outcome (say, illness): the pathway to becoming ill and the pathway of recovery once being ill.

Both pathways encompass aggregate and individual level factors such as living in a deprived neighbourhood, local availability of health care services, educational level, manifest problems (such as substance use) and uptake of preventive or curative health care services.

However, where vulnerability is usually based on the concept of risk accumulation (Timmermans et al., 2011), we emphasise the circularity and reinforcement of risk factors. Vulnerability then

becomes the net result of risk factors (i.e. challenges) and availability of personal and social resources: a person can be vulnerable in context A (due to lack of social and environmental resources), but be unaffected in context B; and, in a deprived context still some persons stay healthy, while others fall ill. This implies that vulnerability is prevalent in all socio-economic strata: women from the most upper socio-economic strata, while not being deprived, more frequently are vulnerable in the perinatal context as they show unhealthy habits (e.g. alcohol consumption, recreational drug use) and non-compliance to suggested changes, as they feel invulnerable.

In the context of pregnancy i.e. maternal and fetal health, we define vulnerability at the operational, i.e. measurement, level as the combined presence of 1. one or more indicator conditions (representing challenges, risk factors to fetal health): psychopathology (past and present), psychosocial problems, and substance use, with 2. lack of individual and/or social resources such as low education and being health illiterate. The indicator conditions and resource availability are measured with the validated Mind2Care instrument.

Regional study organisation

The RPCSWN is one of ten Dutch consortia, instituted in 2012 by joint initiative of government, the professional organizations (Royal Dutch Organization of Midwives [in Dutch: KNOV] and the Dutch Association of Obstetrics & Gynaecology [in Dutch: NVOG]), all university medical centres (10), and the medical research council (ZonMw). Together these consortia cover almost all births in The Netherlands. Within the focus of improving perinatal outcome level, each regional consortium developed a region specific intervention programme (<http://www.zonmw.nl/nl/>). The RPCSWN unites the about 90 regional stakeholders: midwifery practices, obstetric and paediatric units, maternity care organizations, laboratories and ultrasound centres, and associated administrative and educational institutions. Through a Delphi-panel like procedure, the RPCSWN decided to direct the intervention programme towards structured care for vulnerable pregnant women.

Participation by stakeholders is on a volunteer base. All but a few health care providers in the RPCSWN area participate. The RPCSWN offers a) the free attendance to quarterly symposia on prioritised topics, and b) the free use of any practice tool available or becoming available during study. The current paper reports of the protocol, at the unit level, a) the prevalence of vulnerability and b) the current approach in dealing with vulnerable pregnant women. This analysis (phase 1) should prepare the region-wide intervention to be implemented the RPCSWN study (phase 2).

Midwifery practices and obstetric units

All midwifery practices and obstetric units participating in the RPCSWN were invited to participate in a structured interview regarding their current provision of care for vulnerable pregnant clients (data source 1), were asked to permit use and comparison of anonymized client data (Perined) at the unit level (data source 2), and were invited to insert the client self-report Mind2Care questionnaire (M2C) at a temporary base during the first antenatal visit (i.e. booking visit; data source 3). All reported outcomes are on the unit level unless otherwise stated.

Clients

All participating units were invited to ask their clients to participate in the study, for a defined period (usually 6–9 months). Clients either received a questionnaire by post or e-mail or were directly asked to participate around the time of the first antenatal

visit. There were no exclusion criteria. Before entering the study, written informed consent was obtained from each client.

Data collection

Data source 1

Data source 1 consisted of structured interview data, obtained by two trained members of the research team (AV and NdG in most cases, GB in some) who interviewed two or more professionals who were able to provide an accurate description of the provision of antenatal care in their practice. These were usually the senior professionals of the unit or the professionals with specific interest in vulnerable clients. The interview contained ten semi-open questions regarding a.o. the professional-estimated prevalence of vulnerability among their client population (i.e. the subjective caregiver's perception of workload) and the associated experienced burden induced by the process of trying to meet the client needs and to satisfy professional standards in the vulnerable group. Questions also regarded the unit structure of the organisation of antenatal risk management.

Each interview lasted 1.5–2.5 hours; a transcript was made and presented back to the interviewed party. Occasionally the interviewers asked for additional information if in retrospect a question was not fully addressed. The amended and agreed version of this transcript served as formal data source for the study. The subjective workload was directly derived from the transcript texts; a quantifying question on the estimated percentage of vulnerable clients in the unit was part of the interview. The associated burden was not recorded as response to a factual quantifying question in the interview but was deduced from the research team based on the interviewee's reply to three questions relating to the additional work strain induced in meeting care standards for vulnerable clients. Burden was classified as 'low', 'medium' or 'high', depending on the presence of semi-quantitative key words in the reply of each unit. These key words referred to the amount of extra time required for vulnerable clients and its availability in the specific unit, self-reported level of expertise relating to working with vulnerable clients, and to the associated mental pressure experienced by the professional. The degree to which antenatal risk management was judged to be structured (systematic triage), was based on the presence of one or more of the following: (1) the adherence to a fixed explicit method of screening, including complete registration, (2) the adherence to an explicit interdisciplinary process of risk management, including the use of care pathways (Vos et al., 2015a), (3) the assignment of the first antenatal visit to a dedicated trained person (midwife, nurse, etc.), and (4) the extension of the standard allocation of consulting time in case of recognised vulnerability. Full presence of a criterion provided 2 points, partial presence 1, absence 0. On few occasions criterion information was unavailable from the interview; in some of these cases the information was already known from other sources (e.g. published information), in other cases, the interviewee was approached again for this specific information. The separate scores on the four criteria were added, and subsequently grouped into 'low', 'medium' or 'high'. All judgements were usually made independently by NdG and AV, and later reconciled if necessary. Judgement and classification was made independently from the other data (blinded). In the text we restrict the term 'triage' to the technical aspects of structured and systematic risk management. In clinical terms the first antenatal visit and subsequent antenatal visits comprise of more elements than risk management alone.

Data source 2

Data source 2 are anonymized data from Perined, aggregated at the midwifery practice and obstetric unit level. Perined contains data of more than 97% of pregnancies in The Netherlands. Data is

routinely collected by 94% of all midwives and 99% of all gynecologists ([The Netherlands Perinatal Registry, 2014](#)). For all but one participating units, data from 2013 was used to determine unit characteristics (i.e. the annual number of births [proxy for unit 'size'; in one unit only 2012 data were available] and the (average) proportion of SGA [small for gestational age; birth weight < 10th percentile for gestational age]) and the objective vulnerability caseload. The latter was registry-based defined as the proportion of clients (per unit) who satisfied 2 out of the following 4 criteria: having the lowest socio-economic status [SES; < 20th percentile based on aggregated income data by zip-code from Statistics Netherlands Organization (CBS, <http://www.cbs.nl>)], being from non-Western descent, being young [< 20 years], or of showing high parity [4 or more]. The 2 out of 4 definition is inevitably arbitrary, but rests on the concept of accumulation of risks ([Timmermans et al., 2011](#)); the underlying data are reliable and the definition allows for external comparison.

Data source 3

Data source 3 consisted of data obtained through the application of a the Mind2Care screening instrument for vulnerability (M2C) during the first antenatal visit. The M2C is a validated self-report screening questionnaire containing questions on Psychopathology (current and past), Psychosocial problems and Substance use (PPS) as well as general questions on attitude towards care, health literacy and socio-demographics.

The M2C as vulnerability questionnaire has been specifically designed for use by pregnant women, has satisfying psychometric properties ([Quispel et al., 2013](#)) and is supported by The National Expertise Center for Perinatal Psychiatry (in Dutch: LKPZ) as the instrument of choice for detecting vulnerability (<http://www.lkpz.nl>). At this stage, the client data resulting from this screening were not made available to the caregiver or the client, but collected for comparative reasons only; this was explained ex ante to the client as part of the consent procedure. With the M2C, current psychopathology was scored as present in the case of current use of psychotropic medication, current treatment for psychological problems or a sum score of 9 or higher (range 0–30) on the 10-item Edinburgh Depressions Scale ([Bunevicius et al., 2009](#); [Cox et al., 1987](#)). Past psychopathology was scored as present if at least one of four 'yes/no' questions relating to having ever experienced a traumatic event, depressive period, panic attack or being hospitalised for psychological problems was answered with 'yes'.

Psychosocial problems contained five 'yes/no' questions regarding experiencing adequate social support, relational problems, financial problems, housing problems, or domestic violence (past or current). Psychosocial problems were scored as present if at least one item was scored with 'yes'.

Substance use was scored as present if a client attested to using at least 1 glass of alcohol and/or 1 cigarette per day at any point during pregnancy including those who stopped finding out to be pregnant and/or any drugs at any point during the pregnancy, regardless of type, frequency and amount.

Features of deprivation were based on level of education, health literacy and health locus of control. Education was classified as 'low', 'medium' or 'high'. Health literacy was assessed using three 5-point Likert items that are generally used in identifying health illiterate individuals ([Powers et al., 2010](#); [Haun et al., 2012](#)). The sum score (range 3–15) is categorized into 'inadequate', 'marginal' or 'adequate'. Health locus of control was assessed using the 5 negative items of the Pearlin Mastery Scale ([Pearlin and Schooler, 1978](#); [Gadalla, 2009](#)). Each item is scored on a 5 point Likert Scale, the sum score (range 5–15) is then categorized into 'inadequate', 'marginal' or 'adequate'. Features of deprivation were present if at least one out of the three characteristics (i.e. education, health literacy or health locus of control) was scored as 'low /

inadequate' or if at least two characteristics were scored 'medium / marginal'.

Finally, public data e.g. on degree of urbanisation at the unit level (zip code based) were obtained from Statistics Netherlands Organization (CBS, <http://www.cbs.nl>). Since 1992, the so-called 'zip-code-density' is an accepted national measure for degree of urbanisation. This measure is defined as geographical point estimate as the number of zip-codes in a radius of q km (standard set to 1) around a geographical point, divided by the area of the circle ($\pi * q^2$). Based on this criterion, we assigned all participating units to either a 'low' (< 1500 zip-codes) or 'high' (> 1500 zip-codes) degree of urbanisation using the physical address of the unit as defining geographical point.

Analysis

For a unit to be included in the current analysis, sufficient data had to be available on all three data sources. At the time of this study, 53 midwifery practices and obstetric units have been interviewed and have provided information on the subjective workload and associated burden and the degree of structured organisation of antenatal risk management. So far we introduced the M2C in 29 of these units. Sixteen units provided sufficient M2C data (a minimum of 50 clients) to establish the prevalence of vulnerability aspects of Psychopathology, Psychosocial problems, and Substance use (PPS).

Data analysis starts with a comprehensive description of the interview and registry (Perined) data. We then describe the relation between the caregiver's perception of workload and the registry-based caseload as proxy for subjective and objective workload respectively. This relation is tested using the Wilcoxon signed-rank test for related samples.

Next, client characteristics (age, education, parity, ethnicity) and the prevalence of PPS and features of deprivation by degree of urbanisation ('low' or 'high') are presented. Chi-square tests are used to test the association of PPS-prevalence with degree of urbanisation. Alpha was set at .001 to correct for chance capitalisation (Bonferroni correction).

Finally we investigate whether a higher degree of structuredness of antenatal risk management relates to the experienced burden of vulnerable clients. The objective caseload (X-axis) is plotted against the subjective burden as reported during the interview, for each unit (Y-axis). In this data presentation the degree of structuredness was shown for each unit (datapoint). This presentation is exploratory with regard to testing the effect of structuredness, as numbers are too small to permit statistical testing.

Units are grouped, for presentational convenience, into three groups. Group I represents non-actively participating units i.e. units lacking in-depth interview data ($n=23$) and/or lacking any M2C screen data ($n=24$); group II consists of units with data on all data sources, yet insufficient volume of M2C screen data ($n=13$); group III consists of units with sufficient data on all data sources, respectively ($n=16$), of which a total of $n=6$ units are situated in a low urbanisation area (group IIIA) and $n=10$ units in a high urbanisation area (group IIIB; see [Fig. 1](#)). All quantitative analysis are conducted with SPSS version 21. At the unit level statistical testing usually was restricted due to the number of units. These results are presented as exploratory results.

Medical Ethical Review Board

The study sponsor was 'ZonMw' study grant number 50-50200-98-061.

We obtained permission for all 3 data sources from the Medical Ethical Review Board of the Erasmus Medical Center (MEC-2013-508). The permission to use anonymized Perined unit data was

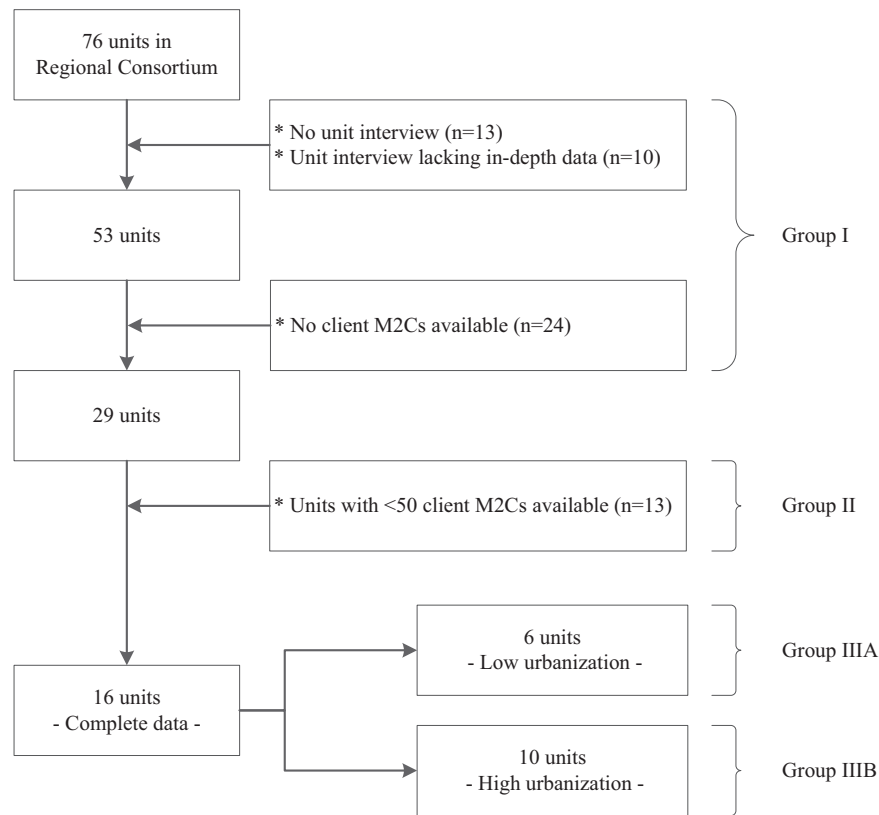


Fig. 1. Flow chart of participating midwifery practices and obstetric units of the Regional Perinatal Consortium South-West Netherlands (RPCSWN).

part of the RPCSWN membership and the grant application. The permission included the condition that practices too would be anonymized, which restricted the amount of detail on practice characteristics (the number of annual births is represented in multiples of 500).

Findings

Table 1a describes on the group level the midwifery practices and obstetric units involved in the RPCSWN and shows average % SGA births and average workload characteristics. In all three groups, the average annual number of births was < 500. Table 1b describes on the unit level the midwifery practices and obstetric units of group III (the group with sufficient data on all data sources). It shows the % SGA births, workload and antenatal risk management characteristics. All but three of these units have

< 500 births per annum. Units involved in the detailed analysis of the study (group III units) and the remaining units did not differ.

Of group III (Table 1b), 6 out of 16 units were assigned to the 'low' urbanisation group (group IIIA) and 10 to the 'high' urbanisation group (group IIIB). The majority of group III units were midwifery practices. The average proportion of SGA in a unit tended to be lower in group IIIA (8.3%, range 5.6–10.5%) compared to 9.6% (range 7.1–12.7%) in group IIIB (no statistical testing, see Methods). At the unit level, SGA is more prevalent among low SES clients (comparing the column %SGA SES p20 with %SGA SES p80). The objective vulnerability caseload ranges from 2.5% to 37.3% in group IIIA versus 7.7 to 88.1% in group IIIB units (average 18.0% versus 38.4%; average not shown in table). The subjective vulnerability workload showed equal wide ranges and differed between group IIIA (average 5.9%) and group IIIB (average 13.2%).

Table 2 shows individual sociodemographic and PPS data from all participating clients of group III, according to urbanisation.

Table 1a Midwifery practice and obstetric unit characteristics and workload characteristics on the group level, 2013 (N=76).

Group	Group description				Workload	
	Average #Births	% SGA	SGA Contrast		% Objective Vuln. Caseload	% Subjective Vuln. Workload
			% SGA SES p20*	% SGA SES p80†		
Group I [§] (n=47)	< 500	9.7	11.8	8.7	35.7	15.0
Group II [‡] (n=13)	< 500	9.6	10.7	8.2	29.4	18.0
Group III ^{**} (n=16)	< 500	9.1	10.5	7.5	30.8	10.0

Abbreviations: SGA, small for gestational age (< p10 weight adjusted for gestational age); SES, socioeconomic status.

* %SGA among newborns from women of the 20% lowest income zip-code areas.

† %SGA among newborns from women of the 20% highest income zip-code areas

§ Units with no interview, interview without self-estimated vulnerability workload or no client M2Cs available.

‡ Units with client M2Cs available, but less than 50 client M2Cs completed.

** Units with data available on all measures.

Table 1b

Midwifery practice and obstetric unit characteristics and workload and antenatal risk management characteristics on the unit level according to low (Group IIIA) and high (Group IIIB) urbanisation, 2013 (N=16).

Unit	Unit description					Workload		Antenatal risk management*	
	Type of unit	#Births	% SGA	SGA Contrast		% Objective Vuln. Caseload	% Subjective Vuln. Workload	Degree of Structure	Experienced Burden
				% SGA SES p20 ^{†,§}	% SGA SES p80 ^{‡,§}				
Low urbanisation (Group IIIA; n=6)	OU	> 500	10.1	10.1	–	37.3	5.0	Medium	High
	MP	< 500	10.5	11.7	–	20.3	3.0	Medium	Medium
	MP	< 500	6.3	4.0	6.6	36.9	2.5	Medium	Medium
	MP	< 500	5.6	–	3.4	2.9	10.0	Low	Low
	MP	< 500	9.5	10.5	10.2	8.0	10.0	Low	Medium
	MP	< 500	7.5	–	8.3	2.5	5.0	Low	Low
High urbanisation (Group IIIB; n=10)	OU	< 500**	8.7	10.5	7.1	24.5	6.0	High	Medium
	OU	< 500	12.7	14.2	7.9	65.4	26.0	High	Medium
	OU	< 500	9.7	9.1	8.5	20.8	10.0	Medium	High
	MP	< 500	8.4	10.0	–	43.5	10.0	High	Low
	MP	< 500	10.5	9.4	–	32.7	10.0	Low	Medium
	MP	< 500	7.1	–	8.1	7.7	5.0	Low	Low
	MP	< 500	8.6	11.6	6.2	21.2	10.0	Medium	Medium
	MP	> 500	11.2	11.2	9.5	88.1	20.0	Medium	High
	MP	> 500	10.2	12.7	7.6	52.1	30.0	Low	High
	MP	< 500	8.5	11.0	6.5	28.0	5.0	Low	Medium

Abbreviations: MP, midwifery practice; OU, obstetric unit; SES, socioeconomic status; SGA, small for gestational age (< p10 weight adjusted for gestational age).

* The antenatal risk management characteristics were empirically composed by the research team based on the interview replies.

† %SGA among newborns from women of the 20% lowest income zip-code areas.

§ If fewer than 3 cases, percentage not calculated.

‡ %SGA among newborns from women of the 20% highest income zip-code areas.

** No data available on 2013, 2012 data used.

Education of participating clients was on average higher than expected in this region; among respondents education was higher if urbanisation was higher (group IIIA 51.6% versus group IIIB 60.3%). Non-western ethnicity was lower than expected in both group IIIA and IIIB.

Altogether the average prevalence of any psychopathology (past or present) was 41.1%. Restricted to manifest current psychopathology the proportion decreased to 12.9%. One or more psychosocial problems were reported in 15.9% of all cases; substance use in 13.9%. Finally, a combination of problems (2 or all 3), was reported by 16.5% of all participants. The prevalence of PPS differed between group IIIA and IIIB, with significant higher prevalence of most problems among women from group IIIB (higher urbanisation).

Fig. 2 relates subjective workload and objective caseload of vulnerable clients. The professional estimates generally were of the same order of magnitude as the registry based estimates. The hypothesised direct relation between the two was confirmed by the Wilcoxon signed rank test ($Z = -.83, P = .41$). Two clusters of units could be distinguished: in the lower left quadrant, units with generally a rather low objective vulnerability prevalence also reporting a low subjective estimate of the prevalence; in the upper right quadrant 3 units show rather high prevalence both in objective and subjective terms. Within these 2 clusters, the relation between professional and registry-based estimates was less clear. The upper left corner points to overestimation by the professional, the lower right to underestimation. We observed that units with the most systematic approach tended to underestimate true prevalence, while the reverse is also true.

In Fig. 3 the objective vulnerability prevalence as proxy for objective caseload was related to the experienced burden, stratifying for the reported degree of structuredness of antenatal risk management.

A higher objective vulnerability caseload (going to the right on the X-axis) was not universally associated with a higher degree of subjective burden: the <10% vulnerable clients group was

associated with both low ($n=3$), medium ($n=5$) and high ($n=1$) burden, as much as 50% vulnerable clients could be associated with both medium ($n=1$) and high ($n=2$) burden. Stratification showed that the degree of structuredness in part explained the subjective burden: the units with a high degree of structuredness (big circles), showed lower burden compared to other units with the same objective caseload of vulnerable clients (small and medium circles).

Discussion

This study to our knowledge is the first to address empirically the effect of a specific antenatal practice setting on the subjective workload and associated burden of vulnerable clients, in a region with multiple deprivation areas. We observed two, seemingly different, results where conclusions have limited statistical strength due to the number of units. First, contrary to our expectation we observed only a crude relation between the objective caseload and the professionally estimated vulnerability workload at the unit level, with generally underrating of the objective prevalence. Secondly, we observed an interpretable relation between experienced burden and objective caseload from vulnerable clients, where the experienced burden was negatively associated with systematic antenatal risk management. Even if caseload is high, it seems that it can be managed, confirming the general plea for the use of checklists and the evidence on efficiency of formal triage procedures (Gawande, 2010). However, even though checklists may aid the structuring and uniform risk selection in antenatal practice, its use is subject to limitations, most prominently the risk of false negative risk (i.e. socially desirable answers), the probability of false assurance (i.e. a checklist can never capture all information under all conditions), and filling out problems due to low levels of health literacy, cognitive disability or language barrier. This entails that a checklist cannot be used as a stand-alone diagnostic instrument. We therefore advocate the

Table 2
Sociodemographic characteristics of clients and prevalence of psychopathology, psychosocial problems and substance use according to low (Group IIIA) and high (Group IIIB) urbanisation (N=1590*).

Characteristics	Urbanisation level		Total	p
	Low (Group IIIA)	High (Group IIIB)		
Age, mean, y	30.0	30.7	30.5	
< 20, %	0.5	0.9	0.8	
> 35, %	14.8	20.3	18.4	
Education, %				
Low	5.0	5.2	5.1	
Medium	43.5	34.5	37.6	
High	51.6	60.3	57.3	
Primiparae, † %	44.4	52.4	49.6	
Non-Western, %	2.8	3.8	3.5	
Prevalence of problems, %				
Psychopathology past and present	34.7	43.9	41.1	< 0.001
Psychopathology present only	10.6	14.1	12.9	0.14
Psychosocial problems	14.2	16.9	15.9	0.16
Substance use	9.2	16.4	13.9	< 0.001
Combination of past and present problems (2 or more)	11.9	18.9	16.5	< 0.01
Combination of present problems (2 or more)	6.8	9.3	8.4	< 0.001
Features of deprivation amongst clients reporting: %				
Psychopathology past and present	37.4	27.4	30.3	
Psychopathology present only	56.9	48.3	50.7	
Psychosocial problems	41.6	49.7	47.2	
Substance use	42.0	39.1	39.7	
Combination of past and present problems (2 or more)	52.3	43.1	45.4	
Combination of present problems (2 or more)	59.5	59.8	59.7	

* The average prevalence of amount of missing data per variable is < 1% (range 0% – 2.6%).

† Based on the country of birth of the mother.

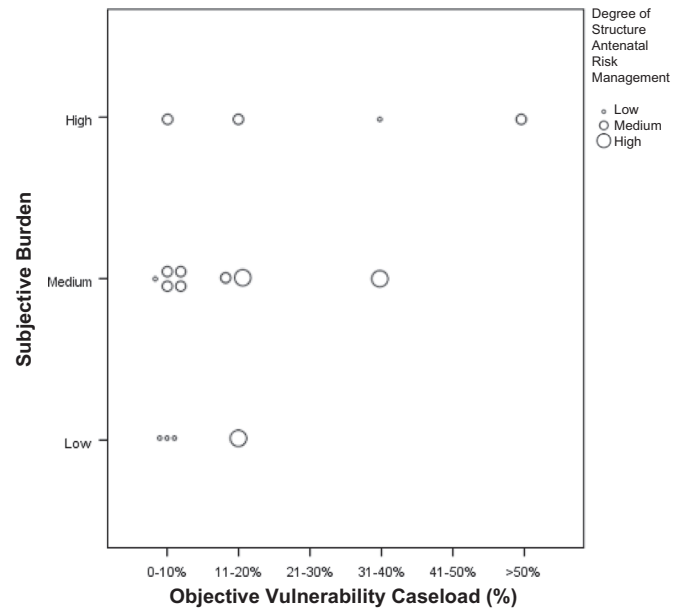


Fig. 3. Subjective burden according to objective vulnerability caseload for different levels of structuredness of antenatal risk management of Group III midwifery practices and obstetric units (N=16).

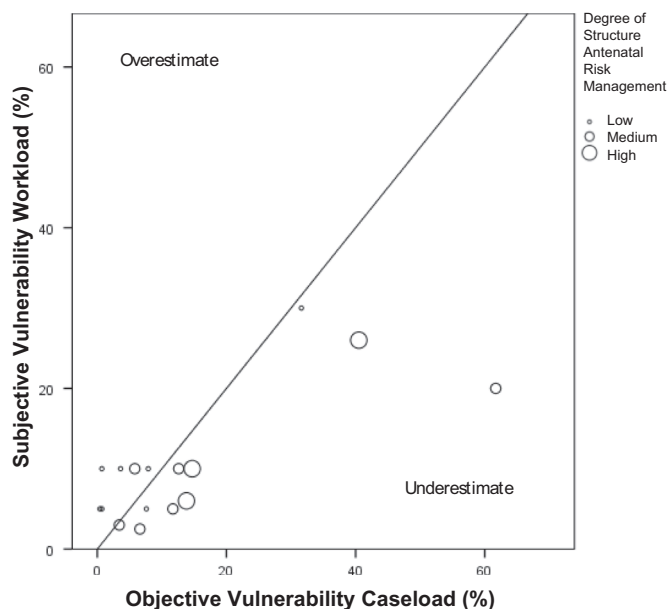


Fig. 2. Subjective vulnerability workload versus objective vulnerability caseload for different levels of structuredness of antenatal risk management of Group III midwifery practices and obstetric units (N=16).

combined use of checklist (preferably before the first antenatal visit) and a face-to-face interview in which the results are discussed (i.e. checklists results verified and/or confirmed). In the case of truly poor literacy or other barrier that cannot be overcome with support (i.e. translator), we generally advise to rely on thorough face-to-face interviewing only. Moreover, changing antenatal practice requires an attitude change towards structured and uniform risk selection as well as an initial investment (i.e. time, finances, IT-facilities) to facilitate the introduction, both of which require significant effort from caregivers.

Vulnerable pregnant women have priority in clinical guidelines (National Institute for Clinical Excellence, 2014) and as topic of research agendas, but we could not find literature describing the professionals' point of view in the approach of this client group. We interpret this as lack of evidence on how to optimise effective and efficient care i.e. how to achieve adequate risk management within acceptable time limits. Evidence lacks on interventions to reduce adverse perinatal outcomes through improved antenatal care in vulnerable women. In surgical literature, available evidence shows screen checklists to perform well in selecting high risk cases, and in improving safety; a checklist approach proves efficient compared to ad hoc professional judgement (Wedding et al., 2007; Geersing et al., 2010; Russ et al., 2013; Treadwell et al., 2014). Few information exists on the organisational benefits, if any, in our context. We compared structured screening versus conventional professional judgement, in a regional practice setting where complex cases are commonplace (De Graaf et al., 2013b), and optimal performance is under time pressure. While systematic all-case screening has been promoted in antenatal care (Honest et al., 2009; Vos et al., 2015a, 2015b; Requejo et al., 2013) the professional balance of such an approach has yet to be made. Studies reporting that the time involved in checklist screening in vulnerable clients appears acceptable are very scarce (Quispel et al., 2012; van Veen et al., 2015).

We could not find an obvious explanation for the weak relation between objective and subjective prevalence. First, our registry-based definition inevitably is crude in view of the minimal risk information available in the registry. Moreover, we expect that midwifery professionals use multiple criteria sets, in particular in

moderate risk cases. Both in cases with a very low or very high-risk load, judgement heterogeneity will be less.

Our study shows strengths and limitations. Its strength is the full engagement of essentially all perinatal caregivers of a large region (2.5 million inhabitants, about 25,000 births) where a stepwise Delphi-like procedure discovered shared professional ambitions, frustrations and worries in providing care for the deprived. Apart from midwives and gynecologists, also paediatricians, maternity care service workers and neonatal and youth health professionals participated. Our focus on the professional and institutional perspective, and the non-interference policy, implies that the achievement of uniformity of empirical procedures and data sources from heterogeneous 'study units' is a challenge. Also, statistical testing is limited at the unit level, due to small numbers. For the current analysis the units included were representative of the South-West Netherlands, but more units with complete data would still have strengthened our tentative conclusions. Our analysis with this set of units was scheduled as study protocol requirement.

On the client level our sample is less representative of the region due to the overall high prevalence of highly educated and Western women. We assume this response bias to be by and large the same in all units. Thus, we think the general relation between urbanisation and the observed unit-specific proportions of psychopathology, psychosocial problems and substance use to be valid.

In the future we expect more information will emerge on modernising methods of triage and screening in antenatal care. We hope that projects will not only report outcomes from the client's point of view, but also on the contribution to the professional burden if caseload of high risk clients is high (Vos et al., 2015c). Our study suggests that changing antenatal risk management practice policies towards more structured care provision not only may benefit vulnerable clients and their offspring, but also may benefit the health care providers in labour satisfaction.

We assume that efficiency will be enhanced from structured triage, and interprofessional information exchange will profit from standardisation (Gawande, 2010). Research may discover to what extent health care professionals specialised in the antenatal intake (i.e. booking visit or first antenatal visit) are a valuable option. Also financial arrangements have to be rearranged as – like in other European countries – the reimbursement rules do not contain incentives to adapt service intensity in case of vulnerable clients. The members of the RPCSWN already pointed to the need for reshaping the reimbursement rules towards a more on need-base rather than a nominal pro capita base.

Conclusions and clinical implications

Increased prevalence of vulnerable clients induces an increased strain on midwives, obstetricians and other health care professionals involved in antenatal care. If caseload is high the burden may be less if antenatal triage is on a systematic base.

Conflict of interest disclosure

The authors have no conflicts of interest to disclose.

Acknowledgements

We thank all caregivers of all midwifery practices and obstetric units that participated in this study by participating in a structured

interview and temporarily introducing the Mind2Care screen instrument into their practice. We also thank the clients of the midwifery practices and obstetric units for participating in this study by completing the Mind2Care questionnaire.

We also acknowledge Perined (The Netherlands Perinatal Registry) for providing aggregated data on the unit level on birth outcomes of past years.

Our thanks also goes out to Chantal Quispel for making available the digital version of the Mind2Care questionnaire and to Jantine van Rijckevorsel-Scheele, for general assistance in data collection.

References

- Aday, L.A., 1994. Health status of vulnerable populations. *Annual Review of Public Health*, 15, 487–509.
- Bonsel, G.J., Birnie, E., Denktas, S., Poeran, J., Steegers, E.A.P., 2010. Dutch report: Lijnen in de Perinatale Sterfte, Signalementstudie Zwangerschap en Geboorte. Rotterdam: Erasmus MC. (accessed 30 July 2015). Available at: (www.nvk.nl/Nieuws/Dossiers/DossierPerinataleZorg.aspx).
- Bunevicius, A., Kusminskas, L., Pop, V.J., Pedersen, C.A., Bunevicius, R., 2009. Screening for antenatal depression with the Edinburgh depression scale. *Journal of Psychosomatic Obstetrics and Gynaecology* 30, 238–243.
- Cox, J.L., Holden, J.M., Sagovsky, R., 1987. Detection of postnatal depression. Development of the 10-item Edinburgh postnatal depression scale. *The British Journal of Psychiatry* 150, 782–786.
- De Graaf, J.P., Steegers, E.A., Bonsel, G.J., 2013a. Inequalities in perinatal and maternal health. *Current Opinion in Obstetrics & Gynecology* 25, 98–108.
- De Graaf, J.P., Ravelli, A.C., de Haan, M.A., Steegers, E.A., Bonsel, G.J., 2013b. Living in deprived urban districts increases perinatal health inequalities. *Journal of Maternal-Fetal & Neonatal Medicine* 26, 473–481.
- Denktaş, S., Bonsel, G.J., van der Weg, E.J., et al., 2012. An urban perinatal health programme of strategies to improve perinatal health. *Maternal and Child Health Journal* 16, 1553–1558.
- EURO-PERISTAT Project, with SCPE, EUROCAT, EURONEOSTAT. 2008. European Perinatal Health Report. Available from: (www.europeristat.com) (Accessed 30 July 2015).
- Flood, C.M., 2010. Is Canada odd? A comparison of European and Canadian approaches to choice and regulation of the public/private divide in health care. *Health Economics, Policy and Law* 5, 319–341.
- Gadalla, T.M., 2009. Sense of mastery, social support, and health in elderly Canadians. *Journal of Aging and Health* 21, 581–595.
- Gawande, A., 2010. *The Checklist Manifesto: How to Get Things Right*. Metropolitan Books, New York.
- Geersing, G.J., Janssen, K.J., Oudega, R., et al., 2010. Diagnostic classification in patients with suspected deep venous thrombosis: physicians' judgement or a decision rule? *The British Journal of General Practice* 60, 742–748.
- Gobbens, R.J., Luijckx, K.G., Wijnen-Sponselee, M.T., Schols, J.M., 2010. In search of an integral conceptual definition of frailty: opinions of experts. *Journal of the American Medical Association* 304, 338–343.
- Grabovschi, C., Loignon, C., Fortin, M., 2013. Mapping the concept of vulnerability related to health care disparities: a scoping review. *BMC Health Services Research* 94, 1–11.
- Haun, J., Luther, S., Dodd, V., Donaldson, P., 2012. Measurement variation across health literacy assessments: implications for assessment selection in research and practice. *Journal of Health Communication* 17 (sup3), S141–S159.
- Honest, H., Forbes, C.A., Durée, K.H., et al., 2009. Screening to prevent spontaneous preterm birth: systematic reviews of accuracy and effectiveness literature with economic modelling. *Health Technology Assessment* 13, 1–627.
- Mejdoubi, J., van den Heijkant, S.C.C.M., van Leerdam, F.J.M., Heymans, M.W., Crijnen, A., Hiraasing, R.A., 2015. The effect of VoorZorg, the Dutch nurse-family partnership, on child maltreatment and development: a randomized controlled trial. *PLOS ONE* 10, e0120182, 1–14.
- National Institute of Clinical Excellence (NICE), 2014. Antenatal and Postnatal Mental Health. The NICE Guideline on Clinical Management and Service Guidance 192. National Institute for Clinical Excellence, London.
- Pearlin, L.I., Schooler, C., 1978. The structure of coping. *Journal of Health and Social Behavior* 19, 2–21.
- Poeran, J., Steegers, E.A., Bonsel, G.J., 2012. [Approach to perinatal mortality in the Netherlands: outcomes of a systematic expert study]. *Nederlands Tijdschrift voor Geneeskunde* 155, A4499, 1–5.
- Poeran, J., Maas, A.F., Birnie, E., Denktas, S., Steegers, E.A., Bonsel, G.J., 2013. Social deprivation and adverse perinatal outcomes among Western and non-Western pregnant women in a Dutch urban population. *Social Science & Medicine* 83, 42–49.
- Poeran, J., Borsboom, G.J., de Graaf, J.P., Birnie, E., Steegers, E.A., Bonsel, G.J., 2015. Population attributable risks of patient, child and organizational risk factors for perinatal mortality in hospital births. *Maternal and Child Health* 19, 764–775.
- Powers, B.J., Trinh, J.V., Bosworth, H.B., 2010. Can this patient read and understand written health information? *Journal of the American Medical Association* 304,

- 76–84.
- Quispel, C., Schneider, T.A.J., Bonsel, G.J., Lambregtse-van den Berg, M.P., 2012. An innovative screen-and-advice model for psychopathology and psychosocial problems among urban pregnant women: an exploratory study. *The Journal of Psychosomatic Obstetrics & Gynecology* 33, 7–14.
- Quispel, C., Bonsel, G.J., Schneider, T.A.J., Lambregtse-van den Berg, M.P., 2013. An innovative screen-and-advice model for psychopathology and psychosocial problems in the pathway of demographic and psychosocial properties and pregnancy outcomes. *Archives of Womens Mental Health* 16 (SUPPL. 1), S23.
- Quispel, C., Bangma, M., Kazemier, B.M., et al., 2014. The role of depressive symptoms in the pathway of demographic and psychosocial risks to preterm birth and small for gestational age. *Midwifery* 30, 919–925.
- Requejo, J., Meriardi, M., Althabe, F., Keller, M., Katz, J., Menon, R., 2013. Born too soon: care during pregnancy and childbirth to reduce preterm births and improve health outcomes of the preterm baby. *Reproductive Health* 10 (Suppl. 1), S4.
- Rogers, A.C., 1997. Vulnerability, health and health care. *Journal of Advanced Nursing* 26, 65–72.
- Russ, S., Rout, S., Sevdalis, N., Moorthy, K., Darzi, A., Vincent, C., 2013. Do safety checklists improve teamwork and communication in the operating room? A systematic review. *The Annals of Surgery* 258, 856–871.
- Sridhar, D., McKee, M., Ooms, G., et al., 2015. Universal health coverage and the right to health: from legal principle to post-2015 indicators. *The International Journal of Health Service* 45, 495–506.
- Stuurgroep Zwangerschap en Geboorte. 2011. Dutch report: Een goed begin - Veilige zorg rond zwangerschap en geboorte. Den Haag: Ministerie VWS. (Accessed 30 July 2015) (<http://www.knov.nl/samenwerken/tekstpagina/333/stuurgroep-zwangerschap-en-geboorte/>).
- The Netherlands Perinatal Registry. 2014. Perinatal care in The Netherlands 2013. Utrecht: The Netherlands Perinatal Registry. (accessed 30 July 2015). Available at: (http://www.perinatreg.nl/uploads/150/153/PRN_jaarboek_2013_09122014.pdf).
- Timmermans, S., Bonsel, G.J., Steegers-Theunissen, R.P., et al., 2011. Individual accumulation of heterogeneous risk explains perinatal inequalities within deprived neighbourhoods. *The European Journal of Epidemiology* 26, 165–180.
- Treadwell, J.R., Lucas, S., Tsou, A.Y., 2014. Surgical checklists: a systematic review of impacts and implementation. *BMJ Quality & Safety* 23, 299–318.
- UN Secretary-General. 2010. Global Strategy for Women's and Children's Health. New York (NY): United Nations. [Accessed 4 February 2016]. Available at: (http://www.everywomaneverychild.org/images/content/files/global_strategy_full/20100914_gswch_en.pdf).
- Van Veen, M.J., Birnie, E., Poeran, J., Torij, H.W., Steegers, E.A., Bonsel, G.J., 2015. Feasibility and reliability of a newly developed antenatal risk score card in routine care. *Midwifery* 31, 147–154.
- Vos, A.A., Posthumus, A.G., Bonsel, G.J., Steegers, E.A., Denktas, S., 2014. Deprived neighborhoods and adverse perinatal outcome: a systematic review and meta-analysis. *Acta Obstetrica et Gynecologica Scandinavica* 93, 727–740.
- Vos, A.A., van Veen, M.J., Birnie, E., Denktas, S., Steegers, E.A., Bonsel, G.J., 2015a. An instrument for broadened risk assessment in antenatal health care including non-medical issues. *Int. J. Integr. Care* 15, 1–15.
- Vos, A.A., Leeman, A., Waelput, A.J., Bonsel, G.J., Steegers, E.A., Denktas, S., 2015b. Assessment and care for non-medical risk factors in current antenatal health care. *Midwifery* 31, 979–985.
- Vos, A.A., van Voorst, S.F., Waelput, A.J., et al., 2015c. Effectiveness of score card-based antenatal risk selection, care pathways, and multidisciplinary consultation in the Healthy Pregnancy 4 All study (HP4ALL): study protocol for a cluster randomized controlled trial. *Trials* 16, 1–7.
- Wedding, U., Ködding, D., Pientka, L., Steinmetz, H.T., Schmitz, S., 2007. Physicians' judgement and comprehensive geriatric assessment (CGA) select different patients as fit for chemotherapy. *Critical Reviews in Oncology/Hematology* 64, 1–9.
- World Health Organization, 2008. Improving maternal and perinatal health: European strategic approach for making pregnancy safer. World Health Organization, Copenhagen, Available online at (http://www.euro.who.int/_data/assets/pdf_file/0012/98796/E90771.pdf) (accessed 2 February 2016).
- World Health Organization, 2015. WHO Recommendations on Health Promotion Interventions for Maternal and Newborn Health. World Health Organization, Geneva, Available at: (http://apps.who.int/iris/bitstream/10665/172427/1/9789241508742_report_eng.pdf?ua=1) (accessed 4 February 2016).
- ZonMw. 2014. Zwangerschap & Geboorte Zuidwest Nederland. Extra aandacht voor kwetsbare zwangeren. *Pre Post* 49, 14–15. (accessed 1 August 2015). Available at: (http://www.zonmw.nl/fileadmin/documenten/Zwangerschap_en_geboorte/Artikel_Pre_Post_49_Zwangerschap_en_Geb.pdf).