

.ZBTUIFOJB (SBWJT "TTPDJBUFE XJUI %JBCFUFE
%BLBS 4FOFHBM 8FTU "GSJDB BOE 3FWJFX P

6RXPDL0D %RXEDFDU6LGH 'LMLGHLOOD %BQQLFML) R<RQVVRXID 0'RXFD 0DL0RXVWDSKD 1\$PLDGRX * 'LRS
DQG 0DQVRXU 1GLD\H 0

'HSDUWPHQW RI 1HXURORJ\)DQQ 1DWLRQDO 7HDFKLQJ +RVSLWDO 3R %R['DNDU 6HQHJDO

'HSDUWPHQW RI 0HGLFLQH 1DWLRQDO +RVSLWDO 3R %R[1LDPH\ 1LJHU

'HSDUWPHQW RI 1HXURORJ\ *DEULHO 7RXUp 8QLYHUVLW\ +RVSLWDO 3R %R[%DPDNR 0DOL
)DFXOW\ RI KHDOWK VFLHQFHV 8QLYHUVLW\ RI 0DUDGL 3R %R[0DUDGL 1LJHU

&RUUHVSRLQGLQGRXVWDO %RXEDFDU 'HSDUWPHQW RI 1HXURORJ\)DQQ 1DWLRQDO 7HDFKLQJ +RVSLWDO
BCPVOBEKNB!ZBIPP GS

5HF GDWH \$SULFF G\$WULO 3XE G\$WULO

&RS\ULJKW %RXEDFDU 6 HW DO 7KLV LV DQ RSHQ DFFHV DUVLFOH GLVWULEXWHG XQGHU WKH WHUPV
XVH GLVWULEXWLRQ DQG UHSURGXFWRU LQ DQ\ PHGLXP SURYLGHG WKH RULJLQDO DXWKRU DQG VRXU

\$EVWUDFW

0\DVWKHQLD JUDYLV LV D UDUH GLVHDVH ZLWK YHU\ IHZ FRQILUPHG FDVHV GHV
FDVH RI D \HDU ROG ZRPDQ ZLWK D KLVWRU\ RI W\SH GLDEHWHV KLJK EORRG
ZLWK DXUD 6KH ZDV UHFHLYHG DW WKH RXWSDWLHQW QHXURORJ\ FRQVXOWDWLR
GLIILFXOWLHV 6KH UHSRUWHG DEQRUPDO DQG IOXFWXDWLQJ PXVFOH IDWLJDELO
V\PSWRPV ZHUH PDUNHG DW HYHQLQJ DQG ZHUH HYROYLQJ VLQFH IRXU \HDU EH
DOVR UHSRUWHG D KLVWRU\ RI SDOSLWDWLRQV H[HUWLRQDO G\VSQHD G\VSK
WKH UHPDLQLQJ ELRORJLFDO WHVWV ZHUH GRUPDO 7KRUDI &7 VFDO ZDV GRUP
UHVXOWV WKH GLDJQRVLY RI DQWLSPK5 P\DVWKHQLD JUDYLV ZDV GHVWDEOLVKHG
IRXU WLPHV GDLO\ DVVRFLDWHG WR FKHUHQWLNQV N\SHDWHVLEUDQG G\DEFS
WUHDWPHQW ZDV PDUNHG E\ D FRP5BWHUFRYU\RT \XSFONBZLBNOMFV DQG ZH
IUHTXHQWO\ OHDGLQJ WR D PLVGLDJQRVLY +LV DVVRFLDWLRQ ZLWK GLDEHWHV L
ZKHQ GHDOLQJ ZLWK SDWLHQWV SUHVHQWLQJ IDWLJXH ZLWK D KLVWRU\ RI GLDEHWH

.H\ZRUG.ZBTUIFOJB HSBWJT "VUPJNNVOJUZ "OUJ BDFUZMDIPMJOF
SFDFQUPST 4FOFHBM

,QWURGXFWRUQ

.ZBTUIFOJB HSBWJT JT BO BVUPJNNVOF EJTFBTF PG UIF OFVSPNVTDMBS
KVODUJPO DIBSBDUFSJ[FE CZGBUJHBCJMJUZ BOE NVTDMF XFBLOFTT JOUFSFTUJO
PDVMPNPUPS NVTDMFT CVMCBS PS TLFMFUBM NVTDMFT < > *U JT EVF UP TQFDJG
BVUPBOUJCPEJFT SFTQPOTJCMF GPS EZTGVOUJPO PG OFVSPNVTDMBS
USBOTNJTJPO JOEVDJOH NVTDMF GBUJHBCJMJUZ < > 7FSZ GFX DPOGJSN
DBTFT PG NZBTUIFOJB HSBWJT BTTPDJBUFE XJUI EJBCFUFT IBWF CFFO
EFTDSJCFE JO UIF "GSJDBO TFUUIJOH 8F SFQPSU B DBTF U @ SFQ• F
DC FA W P49T" À @ ðFH J€•QHSC
U,PPTNJTTð• DT, R€PU 0xT,PU•P X% F ð9p ðDEJ @ T
EZTQIBHJB BOE LH XFJHIU MPTT /FVSPMPHJDBM FYBNJOBUIJPO GPVOE B

0VUDPNF BGUF GJW NPOUIT PG USFBUNFOU XBT NBSLFE CZ B DPNQMFUF
EJTBQQFBSBODF PG UIF QUPTJT SFHSFTTJPO PG EJQMPQJB NPUPS BOE
JNQPSUBOU XFJHIU SFDPWFSZ

'LVFXVVLQR

"VUPJNNVOF NZBTUIFOJB HSBWJT JT B SBSF EJTFBTF XJUI BO FTUJNBUE
QSFWMFODF PG QFS NJMMJPO < > BOE BO JODJEFODF PG DBTFT QFS
ZFB S QFS NJMMJPO QPQVMBUJPO < > .ZBTUIFOJB HSBWJT DBO CF PCTFSWFE BU
BMM BHFT BOE XJUIJO UIF UXP HFOEFST CVU UIFS JT B DMFBS QSFEPNJOBODF
PG GFNBMF DBTFT CFGPSF ZFBST PG BHF #FZPOE UIF BHF PG
ZFBST UIF JODJEFODF BOE QSFWMFODF HBQT CFUXFFO NBMFT BOE GFNBMT BSF
SFEVDFE < > %JGGFSFODF JO UIF DMJOJDBM QSFTFOUBUJPO BHF PG POTFU
BVUPBOUJCPEZ QSPGJM BOE UIF QSFTFODF PS BCTFODF PG UIZNJD QBUIMPZH
BMMPX UP JFOUJGZ TFWFSB TVCDMBTTFT PG NZBTUIFOJB HSBWJT "OUJCPEJF
JOWPMWFE JO WBSJPVT GPSNT PG NZBTUIFOJB HSBWJT BSF EJSFDUFE BHBJOTU
QSPUFJOT PG UIF NPUPS FOE QMBUF BU UIF OFVSPNVTDMBS KVODUJPO < > *O
NZBTUIFOJB HSBWJT XJUI BOUJ "\$13 BOUJCPEJFT UIF "\$13 EFOTJUZ JT
SFEVDFE UIFSFCZ SFEVDJOH FOE QMBUF QPUFOUJBM < >

(FOFUJD GBDUPST GPS BVUPJNNVOF TVTDFQUJCJMJUJ UP NZBTUIFOJB HSBWJT
BOE EJBCFUFT NFMMJUVT IBWF CFFO JFOUJGJFE " HFOF MJOLFE UP UIF FBSMZ
QIBTF PG UIF EJTFBTF TJBMBEFOJUJ BOE JOTVMJUJ QFSJTIFE IBT CFFO
MPDBMJ[FE PO DISPNTPNF OFBS UIF #DM MPDVT 5IJ MPDBUJPO
DPJODJEFT XJUI JODSFBTFE SFTJTUBODF PG MZNPQIPDZUFT UP BQPQUPTJT 5IJ
BCOPSNBMJUJ NBZ GBDJMJUBUF UIF QFSTJTUFODF PG BVUPSFBDUJWF DMPOFT
NZBTUIFOJB HSBWJT UIF SPMF PG UIF HFOF FODPEJOH GPS UIF BMQIB TVC VOJU
PG UIF NVTDMF BDFUZMDIPMJOF SFDFQUPS NBZ FODPEF BO BMQIB TVC VOJU
XIJDI NBZ CF QSFTFOUFE UP UIF JNNVOF TZTUFN CZ)-" DMBTT **
NPMFDVMFT MFBEJOH UP BO BVUP JNNVOF QSPDFTT < >

0VS QBUJFOU JT LOPXO XJUI EJBCFUFT NFMMJUVT GPS NBOZ ZFBST XJUI B
HPPE DPOUSPM PG IFS EJTFBTF BOE JO XIPN UIF EJBHOPTJT PG BOUJ "\$13
NZBTUIFOJB HSBWJT XBT SFDFOUMZ DPOGJSNFE 5ISF GPSNT PG BVUP
BOUJCPEJFT BSF DPOWFOUJPOBMMZ EFTDSJCFE JO BVUPJNNVOF NZBTUIFOJB
HSBWJT BOUJ "\$13 BOUJCPEJFT BOUJ NVTDMF TQFDJGJ SFDFQUPS UZSPTJOF
LJOBTF BOUJ .V4, .(BOUJ -31 BOUJCPEZ .(-31 *O
TFSPOFHBUJWF NZBTUIFOJB HSBWJT QBUJFOUT TFFN UP IBWF MPX UJUFST PG
BOUJ "\$13 BOUJCPEJFT UIBU BSF OPU EFUFDUFE CZ DPOWFOUJPOBMMZ UFTUT
BWBJMBCMF 5IJ XBT EFNPTUSBUFE UISPVHI HFOFUJDBMMZ NPEJGJF)&
DFMMT FYQSFTTJOH EJGGFSFO TVCVOJUT PG NVTDMBS "\$13 BOE SBQTZO
XIJDI JT BO JOUSB DZUPQMBTNJD QSPUFJO TUBCJMJ[JOH UIF "\$13 < > 5IJ
TUVEZ TIPXFE UIBU VQ UP PG TFSPOFHBUJWF NZBTUIFOJB HSBWJT
QBUJFOUT IBE BOUJCPEJFT BHBJOTU "\$13 BHHSFHUF BU UIF DFMM TVSGBDF
5IFT QBUJFOUT IBWF B TJNJMBS QSPGJM JO UFSNT PG DMJOJDBM QSFTFOUBUJPO
SFTQPOTF UP USFBUNFOU BOE UIZNJD BCOPSNBMJUJFT DPNQBSFE UP QBUJFOUT
XJUI BOUJ "\$13 BOUJCPEJFT < >

"U MFBTU EJGGFSFO NFDIBOJTNT TFFN UP CF JOWPMWFE JO UIF SFEVDFE
OVNCF S PG "\$13 BU UIF OFVSPNVTDMBS KVODUJPO JO QBUJFOUT XJUI
NZBTUIFOJB HSBWJT "\$13 CMPDLJOH CZ BOUJCPEJFT < > BOUJHFOJD
NPEVMBUJPO DPSSFTQPOEJOH UP BDDFMFSBUJPO PG UIF JOUFSOBMJ[BUJPO PG
"\$13 XJUI FOEPDZUPTJT BOE JOUSBDFMMVMBS QSPUFPMZUJD EFHSBEBUJPO CZ
MZTPTPNBM FO[ZNFT < > BOE EFTUSVDUJPO PG QPTUTZOBQUJD NFNC SBOF CZ
DPNQMFNFOU BUUBDL DPNQMFY < >

5I EJBHOPTUJD DPOGJSNBUJUP JT CBTFE PO UIF GPMMPXJOH DSJUFSJB < >
'BWPSBCMF FGGFD XJUI DIPMJOFTUFSBTF JOIJCJUPST FMFDUSPQIZTJPMPHJDBM
FYBNJOBUIJPO SFWFBMJOH BCOPSNBM OFV€€

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